DRAGON USER

July 1987

The independent Dragon magazine

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Editorial

JULY rolls round again — one year since DRAGON USER quit the newsstands and went private I don't mind saying that we were threatened with disaster by well meaning folk Who would raise £14 a year? Where would our passing trade go? Wouldn't everyone assume that the Dragon was no more? Weren't we going to take the money and run?

They should have said ' — and run, and run, and run. Yup, we're still running, spite of all the doomy predictions As for the Dragon is dead, well we're still getting people just starting on their first Dragon, phoning up to find out how they can subscribe

Some people forget that there's no such thing as a dead machine as long as there's a live user AND the Dragon has a roster of committed dealers, sticking to their guns

Just like Dragon *User*

So DON'T FORGET TO RENEW YOUR SUBSCRIPTIONS! The lights are staying on all over Europe We might even replace that dickey fluoro tube over my desk

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Subscriptions
UK £14 for 12 issues
Overseas (surface) £20 for 12 issues
ISSN 0265 177 Telex 296275
Dragon User 12/13 Little Newport Street
London WC2H 7PP
US address c/o Business Press International
205 East 42nd St New York NY 10017
Published by Scot Press Ltd

© Scot Press 1987

Typesetting and Production by Artext Limited, London NW1
Printed by Headley Brothers Ltd Ashford Kent
Registered at the Post Office as a newspaper
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How to submit articles

The quality of the material we can publish in *Dragon User* each month will to a very great extent depend on the quality of the discoveries that you can make with your Dragon The Dragon computer was launched on to the market with a powerful version of Basic but with very poor documentation

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long All submissions should be typed Please leave wide margins and a double space between each line Programs should whenever possible be computer printed on plain white paper and be accompanied by a tape of the program

We cannot guarantee to return every submitted article or program so please keep a copy If you want to have your program returned you must include a stamped addressed envelope

Letters

This is the chance to air your views — send your tips, compliments and complaints to Letters Page, *Dragon User*, 12-13 Little Newport Street, London WC2H 7PP.

Round six

CONCERNING the reviews in the March issue about *Fire Force* the comments of Jason Orbaum are mostly correct in that the gun does appear to fire blanks and that the game is extremely hard But I disagree that it is bug ridden as the program runs perfectly with excellent graphics and good sound

It might help all players if Dave Hitchman could tell us which joystick he uses in the game and perhaps give us a hint as to the knack of using the gun as I have spent many hours attempting the game and have yet to complete the first stage

Ian Minshull
11 Graig Y Dden
Glais
Swansea
SA7 9HT

We dropped Dave a line and he writes With regard to your letter of 13-3-87 1) I use a zip joystick 2) As to shooting people all I can say is that it comes with practise Regards, Dave H Just like real life!

CoCo convert

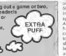
IN the April 87 issue of DU I found the article by Rudy Duyck about CoCo/Dragon Basic conversion to be interesting and useful However there is one important detail that he did not mention A CoCo Basic program cannot be LOADed from disc by a Dragon unless the CoCo disc is modified To use the program described by Mr Duyck one has to transfer the CoCo disc program to tape using a CoCo and then CLOAD it into the Dragon This is not really much faster than just making an ASCII copy to tape from the CoCo disc in which case the full conversion is not needed If you use either of these methods your friends with CoCos will soon begin to get tired of making the copies to tape

An unmodified CoCo disc cannot be LOADed by a Dragon becuase a) the CoCo disc directory is on a different track from that on the Dragon disc b) the directory formats are different c) the file headers are different and d) the disc allocation maps are on different tracks and in different formats I have modified CoCo discs to be LOADed by a Dragon and will be glad to send a copy of my procedure to anyone interested if they will supply an international return postage certificate to cover mailing costs

I have subscribed to DU for over two years and find it to be very helpful Also I am a member of the NDUG and the OS9UG and both of these organisations have provided much useful information and help as well as support for the Dragon

Randy Longshore
15547 Chequer Drive
Chesterfield
MO 63017
USA

Every month we will be shelling out a game or two, courtesy of Microdeal, to the reader/s who send the most interesting or entertaining letters So send us your hints and your opinions, send us your hi-scores and suggestions Send us your best Dragon stories What d'you think we are, mind readers?!



Reviewer's wrights

ENCLOSED is a little poem which outlines the harsh world of the games reviewer Hope J Orbaum finds this as amusing as we at Buzz Software did Never mind Jason it's hard at the top!

S J Goodwin 15 St Stephen Road Penketh Nr Warrington
Cheshire WA5 2AN

What a joyous job it must be
A Dragon User reviewer
Whose only plight
Is to read and write
And take stick from harassed viewers

Games pour in
They're up to my chin
The Ed's deadline is tomorrer
(*It was yesterday actually*)
Oh who gives a XX?
He's only the Boss (*SHE — Sir'*)
Who wants to be a reviewer?

Mr Orbaum from atop his heap
Cries, what does Goodwin know?
His piles aren't half as high as mine
And how come he's got time to rhyne?
His workload must be low!

You mentioned rhymes, then said the Ed
' We had to fix a few-o
'Tomorrer's not yer ideal word,
But it's better than reviewo 'I"

Tagging along

IN THE November issue of *Dragon User* D Rotherypointed out one of the shortcomings of Microdeal's *Filmastr* program The problem is that when you wish to update a file and use the same name the program just tags the updated file onto the end of the old file rather than KILLing the old file first By changing the following lines in the program called OLDFILE the problem appears to be cured

```
3640 MN$ + NM$ +    DAT
KILL MN$ FWRITE NM$ RL
8005 IF ERR – 160 THEN
CREATE NM$ ERRORGOTO
8005 GOTO3640
```

By adding the following line to the same program the number of each record can be printed

```
5587 PRINT # DV R(LN) + 1
```

In the same issue there was a spreadsheet program called *Analyzer* by L Pilz This listing has some errors that need to be corrected to allow the disc user to load and save the spreadsheet By changing the start of lines 6 and 7 a cure can be affected

```
6 FORA = 65TO74 POKES7 A
FORX =  TO99 etc
7 FORA = 65TO74 POKES8 A
FORX =  TO99 etc
```

When trying to load in a saved sheet from tape an IE ERROR can be prevented by changing line 166 and adding the two extra lines

```
166 POKES4 X + 0 GOSUB4
IF EOF( 1) THEN168
167 NEXTZ X
168 RETURN
```

Mike Hides
23 Coniston Road
Dronfield Woodhouse
Sheffield S18 5PY

THANKS for the useful information We have had several enquiries about *Analyzer* which Lothar Pilz is fielding Some of them turned out to be typing errors on the part of the enquirers — it's a long way to go, Oz to get your listings double checked so please triple check 'em before you write to DU.

VAT vex

CONGRATULATIONS on your article by D Rothery called *OS-9 Blues* It was nice to see something written just for the OS-9 users I am sure there are many other OS-9ians who were delighted to read the article especially those with Stylo line feed problems Let's hope that this is the first of many OS-9 articles to be published in *Dragon User*

One OS 9 problem I have is with the **CASH + VAT** program and I was hoping that through the columns of your magazine I may be able to locate anybody involved with the writing of the original program I am unable to locate Computer Support Systems of Walsaw who wrote *Cash + VAT* for Dragon Data so if there is any reader out there who can give me a lead I would me most grateful

Llewellyn Robins
64 Enbourne Road
Newbury Berks

News desk

If you have any new products for the Dragon — software or hardware — ring the News Desk on 01-437 4343

Offer next month

LOOK out for a special offer on Dragon books in the August issue of *Dragon User* Three popular books now out of print have come our way in limited quantities There aren't many of these about We will be offering them to you at about a third of their original price with a free game thrown in while stocks last This is an ideal opportunity to build up your personal Dragon library before the books become unobtainable — at least until the wizard Maginix creator of the first 6809 awakes from sleep beneath Ceer Fulhauagoe and conjures into existence the long awaited Dragon 3G Dragon users who don't want to wait until the Millenium have only to wait until August when further details will be furnished Someone's muttering something about DIY Home Accounting with the software included as well More next month

California CoCo

THE *Dragon User* offices had a visit last week from programmer hacker and wheeler dealer extraordinaire Andre J Lavelle from California bringing newsletters from the South Bay Computer Club and the National OS-9 Users Group in the States

South Bay Color Computer Club

The SBUG meets once a month in Torrance and once a month in Long Beach for demonstrations lectures and chat Members bring along their computers and the club's software library travels along The newsletter has club and CoCo news show reports and programs The March issue carries a suggestion for a Red Cross Data Processing Party on behalf of the US Special Olympics (the equivalent of the UK Wheelchair Olympics) for which the group does a lot of support work and the May issue suggests a picnic There's more to all this than software

The club can be contacted via Andre at 22923 Alexandre Torrance California CA 90502 USA Andre has quite list of discontinued software for sale as well which would be of interest to US Dragon and CoCo owners

50 years in a vault . . .

A REMINDER from the National Software Register that an author's copyright although it exists from the moment a program comes into existence can be successfully pirated if the author cannot prove that it existed at a particular time — for instance if another author copies it and sells or publishes it before the original writer can do so

The National Software Register will store two copies of your program confidentially and supply a numbered certificate for each program

Further details from The National Software Register 235 Chase Side Enfield Middx EN2 0RA

There are of course other ways to prove that a program was in your possession at a certain date The simplest is to mail a copy of the program to yourself by registered mail (where the date is certified) and then store the package in a safe place UNOPENED unless and until you have a barney about possession and have it opened by the courts or some other authority legally able to witness the contents of the packet Make sure the postmark is clear and keep the posting certificate for luck

This is cheaper than having the program witnessed by a Notary or stored in a bank vault and just as effective (as long as you don't lose it)

Contrary to popular belief copyright exists whether or not the material displays a copyright (C) sign or any other indication The little symbol is simply a warning to other people that this is copyright material Copyright stays with an author (a) until he or she sells it or assigns it to somebody else or (b) until 50 years after the death of the author

The NSR *do* say that they will store your programs until 50 years after your death

Disc Superwriter

HANS CHRISTIAN ANDERSON Software of Denmark called us up to say that they now have Dragon Data's *Superwriter II* converted for disc

It's the same text resetter exactly I wanted *Dragon User* to know this because some people have been wondering said the chap from HCR The disc can also be loaded into memory and then saved and loaded to another disc

The package will cost £33.30 plus post and packing Watch *Dragon User* for further details

Clang!

Phil Beed (and various people on his behalf) apologise for a slightly misleading statement of the NDUG's subscription — it's £8.00 to join and £7.50 for subsequent resubscriptions Also points out another member repairs are not literally at cost but are undertaken as cheaply as possible National Dragon User Group 6 Navarino Road Worthing Sussex

Buffer

COMPUSENSE are developing a cache buffering utility *Express/OS 9* for use with their Dragon Plus and OS 9

There is no scheduled release date at present We would be interested in hearing from anyone who uses the Dragon64/Dragonplus/OS-9 and if possible who uses C or Pascal (says Stan Opychal) to test this package and review it for us If you are interested drop the editor a line pronto

Fade out

AS SOON AS DU June arrived we saw that the listings for the Graphics Screen Word processor were almost unreadable in places Often the printers get the blame for this kind of thing when it isn't their fault but in this case the pages left us in good condition (as you can see from the final page) so we will be asking questions

Anyone who wants a clean photocopy please drop us a line No SAE required

German gruppe

APOLOGIES to the Siegfried Computer Gruppe of Germany for missing their first show on May 30th We can now make that up somewhat by publicising their existence They publish a stout A5 magazine *Siegfried's Drachenpost* every two months This is in German (although this issue contains a single cartoon in English!)

Contact the club via Bernd Neuner Dina-Ernstberger Strasse 23 D 8524 Neunkirchen am Brand 1 Bundersrepublik Deutschland

Siegfrieds Drachenpost
OS9

Dragonsoft

New software for review should be sent to *Dragon User* 12-13 Little Newport Street, London WC2H 7PP.

Compose yourself

Program *Music Maker*
Supplier John Penn Software
Price £5.00

MUSIC MAKER is another program that allows you to write your own tunes in four part harmony The tunes still sound as synthesised as they did with for example Microdeal's *Composer* program but this program is leagues above any other in its field for the simple reason that this is a composer designed for a composer not a programmer

Basically there's no conversion needed of music into lines of code because all music is entered onto a rather nice graphic stave Nearly anything can be entered and I haven't found anything missing while I've been inputting my own compositions

The program is controlled mainly with the cursor keys with other functions being provided by other appropriate keys (eg R for rest see pretty easy isn't it!)

It's very difficult to write a long review about a program like this because all that you can say is yes it sounds okay yes it's user friendly yes it's graphically easy to read The only other thing I can really do is give you a list of its capabilities So here goes

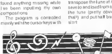
You can set the key and time signature enter notes (of any length including ties and dotted notes) onto bass and treble clef with an option to use some descenders and a facility to cover notes not available on the stave You can enter rests insert and delete notes repeat bars or bits of bars change the tempo transpose the tune at any time save to and load from tape play the tune (pretty obvious one that!) and put half bars on the start

The manual makes it very easy to understand and use the program and the table at the back of the program allows the user who is less well acquainted with the theory of music to enter his own tunes as well

The final important feature of the program is that any tune written using *Music Maker* can be used independently of the master program within your own programs

So in summing up this is the definitive music writing program for the Dragon and if you thought *Composer* was essential you simply must get this

Jason Orbaum



Go to work with an egg

Program *Superkid*
Supplier Quickbeam
Price £8.95

TAKE the glasses off put the boots on get out the cape and prepare to take the illustrious role of a SUPERMAN or at least one's younger brother in this quite simply the best of Dragon games yet!

Yes you've guessed it Your objective is to save the damsel in distress avoiding the various nasties out to destroy your wildest dreams! As Superkid hasn't quite yet mastered the art of flying things soon get increasingly difficult The first screen places you prominently among a series of snails which you may either jump or blast with an egg which is your only weapon and which you can only get by jumping on This task is surprisingly difficult!

Once you have got rid of the snails you travel onwards encountering a buzz happy bee weaving throughout the screen destroying your hopes of success (or at least mine) All this and don't forget those blasted cherries giving you energy vital to your mission

Superb graphics unbelievable sound with the best built-in speech I have heard on any computer makes this an unclassified him With even a section for you hacking freaks too So come on down cos at £8.95 the price is right As you can guess I like this one! (*Dock this man's pay for not mentioning the dogs Has he got a nasty surprise in store! — Ed*)

Simon Jones

Pennies from above

Program *Miser's Dream*
Supplier Microvision
Price £7.95

Miser's Dream is the sort of excellent program that doesn't sell owing to lack of publicity and/or reviews (*I've been on at Microvision but I gather the chap in charge of marketing hasn't twigged that you do actually have to draw people's attention to games a few times before they get around to parting with cash — Ed*)

Another game from Jason Falcus of *Eddie Steady Go* fame it simply involves collecting coins that fall from a cash bag at the top of ten progressively harder screens and guiding them so that they fall into a piggy bank at the bottom

The joystick controls a pointer to move ledges see-saw style either up or down to guide the falling coins into the little pig though there are moving platforms to aid or hinder the falling on several screens Out to stop all this is The American Express (a train not a card!) chuffing happily across the top of each screen which drops dollars down as it passes These destroy any coins that touch them but can be shot away if you reach them quickly enough Also to be tackled is the Money Spider which eats any coins it encounters on the way to the pig This must be killed within the time limit with bonus points equal to remaining time once the little pig has been filled

The start menu allows keyboard control if desired the keys being redefinable and a skill level that ranges from simpleton to Expert Then onto the PMODE3 game screen nicely detailed and laid out the coins bouncing realistically from ledge to ledge Again like *Eddie Steady Go* some screens look ridiculously easy while the later ones require some careful thought The result of getting to the tenth screen will have to wait for a true expert to discover though

This is a very original definitely a just one more go game dealing with a subject close to my heart and retails for £7.95 at which price it gives good value for money A nice finishing touch is that should you beat M T Wallet in the Hall of the Rich table it is possible to reset and save your achievement when you next play

Mike R Vine

Take ten printers . . .

add one, and you have the Dragon User readers' guide to painless printing

OVER the months we have received a pile of letters asking for more advice on which printer to buy for the Dragon. So we asked the people who know best, the users, and the result is the eleven extended reviews of different models by satisfied customers that you can read here.

We haven't attempted to direct you to specific distributors or to be rigid about prices: there are reliable computer dealers countrywide, and prices vary considerably for many models, and change regularly.

The most important thing you can do, if you are not an electronics wizard, is establish that your dealer can make up and supply (as part of the price if possible, although this is not always on offer) the correct connecting cable for the Dragon, and wherever possible to demonstrate the printer with your Dragon, ensuring that you understand how to make the correct dip settings.

But you will find all this, and much other good advice aside, in the reviews which follow.

(Aren't you going to mention the Disc Operating Systems? — Ass. Ed. Go away — Ed.)

Amstrad DMP 2000

ANYONE who wishes to use a Dragon seriously will need a printer especially when using word processors or spreadsheets. My first printer was a Seikosha GP100. This served me very well while I was simply dumping programs or machine code listings. I have now moved on to Flex and am using SP EDIT from Compusense, an excellent word processing package. I therefore needed a better printer. The Amstrad came on the market last summer and after seeing a demonstration of its print quality I decided to buy it in the Comet sale when it was priced £144.95, a bargain price for a machine which gives Epson compatibility with both tractor and friction feed.

The DMP2000 is a lightweight machine with a pair of hinged legs underneath so it can stand over a 500 sheet box of paper. The paper enters the machine at the front, which also makes single sheet feeding easy, and the path is flat so you can print on thin card board, useful for record cards etc.

On the right side of the machine is the mains On/Off switch while at the rear is the centronics connector and two sets of DIP switches, used for setting various parameters. These are very clearly described in the manual.

The printer cable supplied is for connection to Amstrad machines, so a Dragon (20 pin) to centronics must be obtained, or the supplied cable refitted with a Dragon connector IF you have the correct tools and wiring diagram!

On the right front there are three buttons for On line, Form feed, and line feed, together with three indicators for On line, Paper-out and Power on. Above them is the friction/tractor selector lever. I find the machine functions perfectly well with this selected to friction, even with tractor paper. The ribbon is easily fitted and at the left end is the print pressure selector lever.

The manual is very clear. Each printer command is described with simple software in four languages: Amstrad, Commodore, Microsoft Basic and BBC. For Dragon use the Microsoft version, remembering to use PRINT£ 2 in place of LPRINT and the printer springs to life easily.

The printer comes with six basic typefaces but to these can be added many variations.

The printer also has a number of foreign characters which are accessed by control codes. The various characters occupy ASCII codes used by less used symbols, curly brackets etc., but if you are using Compusense Flex they correspond to the built in foreign character sets. The character set may also be preselected on the DIP switches.

There are also the various graphic options, single, double or quad density modes. These follow the usual Epson style 8/9 dot dump routines.

All in all I have found this printer to give reliable, good quality printing at a very reasonable price. It compares well with printers costing several tens of pounds more and I would recommend it to anyone.

I have increased the printer's internal buffer from 2K to 8K which speeds up word processing by not having to wait for the printer, especially when in NLQ mode. This is an easy modification, the parts cost under £5.00 and I will supply details on request.

(Anybody interested in this mod, please send your request to DU with a stamped self addressed envelope and we will pass them on to Frank Philbrow — Ed.)

Frank Philbrow

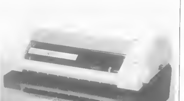
Current Comet price £154.95

Amstrad DMP300

THERE are some questions in this life that are difficult to answer. Why are we here? Why don't MacGowan Consultants come to any shows? and why doesn't anyone build printers that load from the front? Well the first two I will have to leave you to ponder but the third one is now resolved with the new flatbed printers from AMSTRAD. Now I know that name is going to send some of you running for the brown paper bag RRRRGH***!! *(Now look what you've done. You've upset our wordprocessor — Ed.)* but don't knock it till you have tried it.

The people at my local computer shop had been trying to convince me ever since I mentioned replacing my old Seikosha. I had been put off by the name, but when I was offered the loan of a machine what could I say?

I could go on about the joys of the front loading paper train but I won't. It will suffice to say that the machine has a built in stand allowing fanfold paper to placed underneath and restacked behind, and all loading can be achieved from a sitting position. The model I borrowed was a DMP 3000, the new machine developed for the PC clone. It could be set to default to either of two IBM character sets or Epson FX standard, selectable by dip switches. In order to get a line feed with every carriage return it was necessary either to reset another dip switch or to POKE 330,2. Print quality is very good if a little furry on Near Letter Quality. All



the Epson FX typefaces are catered for including auto underline and italics even downloadable characters to allow you to define your own additions to the set All these facilities were called using Epson control codes so if your wordprocessor was written for an Epson it should work with an Amstrad Some extra characters are available in FX mode making it possible to print # and £ without switching sets so you could use it with Peter Whittaker's processor (*Dragon User* September 1985) Another nice touch is that NLQ is selectable by control code or manually This means that I could run off my own copy at draft speed (100 cps) to check before switching to NLQ (20 cps) for the finished article

Graphics capability is outstanding with single double and even quadruple density being supported With all of these there is the choice of eight or nine pin graphics and full details of how to implement them are in the ample handbook

The handbook is two thirds the size of the Dragon manual and covers everything from wiring the plug to control code combinations Indeed my only criticisms of the manual were that it does not actually show how the output will look and nowhere can I find the size of the buffer I suspect it is about 2K but it would be nice to know

The machine comes in two guises DMP2000 and DMP3000 which cost £169 and £195 respectively The 3000 has two IBM character sets the 2000 does not Which one you choose will depend on your future aspirations

Anyone want to buy a Seikosha?

Ken Smith

List price £169 (DMP2000) and £195 (DMP3000)

Brother M-10009

NEEDING a printer for correspondance as well as listings but not the sort that would take over the living room I visited my local Boots They have always been willing to demonstrate anything and have a good selection

The printer I was most impressed with was the Brother M 1009 It is very compatible with my Dragon 32 and has both centronics and RS 232C interfaces if needed Only a normal printer cable is needed to connect up and this can be purchased from one of the advertisers in Dragon User The Brother M 1009 is a dot matrix printer with a 9 x 9 print head and in normal mode will print up to 80 characters per line at 50cps 96 ASCII characters are available and prints in normal or italic in any or a combination of the following ways as it comes emphasised double strike pica elite super and sub scripts Underlining as well as margin form length and skipover are some of the many features available Double speed double density and half tone can all be used in BIT image mode

The Brother M 1009 measures 330 x 190 x 70mm and is less than 60dB noisy so the rest of the family can carry on watching Dallas The print direction is both bi directional logic seeking and unidirectional and you can dump your data in hexa decimal if needed The 85 page manual is reasonable with examples of how to set all the printer codes Also included are pages on the technical side of things and copies of all of the national character sets When I bought mine it was £149 Tractor feed or roll paper options are extra For a while I used cut paper and the roll paper option The roll paper option is marvellous it works well still enables one to use headed note paper it is quick efficient and there is no waste But wanting to be like everybody else I went and bought the tractor feed Now I have to worry about skipover and perforation codes form length printing at the top of the page and the waste paper is incredible You also need room for all the extra paper and somewhere for it to go when you are printing otherwise it can snag

For ease of use though I use Macgowan Consultants Printer Control This makes light work of all my word processing problems and allows you to make full use of all the printer's facilities It also includes things like an adjustable speed in the key repeat so that slow typists do not get rows of leeeeeetters Centering of headings or blocks of data such as address blocks are made easy So are things like block transfer or delete left and right justify user defined graphics and strings multiple prints and variable page end line spacing There are many other facilities built in including being able to enlarge your print up to eight times But image mode is made easy and there are three different character sets that can be used

Included in the package is a picture mode allowing you to load change modify invert move or enlarge your picture you can even add words or duplicate parts of it The package includes a supply of preprogrammed graphics and user defined strings that are simplicity itself to use This whole article including picture was done with this program

Alan Blackwell

Look for price around £150 or less

Centronics GLP

HAVING recently purchased a printer I now know the strain and frustration of looking for a good value printer Especially one that can be used with the Dragon At last my quest is over and I now own a Centronics GLP (Great Little Printer)

But let's start at the beginning One day I woke up and thought to myself I need a printer Fool that I am I thought it would be the simplest of tasks Ha! So eagerly I flicked through the pages of the latest *Dragon User* Nothing Did this put me off ? No I looked through several old issues of *Dragon User* Any luck? (Ha! again) No my pulse raced as months years decades passed Well a good few issues anyway But alas I found very little mention of that fear inspiring device The few I did find would have degraded my existence into complete misery

Just as I was giving up hope and thinking that these printer things were a myth a brainwave hit me I decided to do a rash thing and look through other computer magazines (God protect me from the wrath of the editor) A rash decision I know but I thought I should chance it Mild success! I found some printers of a marginal interest just at the top of my planned expenditure a few were even Epson compatible (gasp) But still I fought on and even committed the sacrilege of borrowing an *Acorn User* (spits on the ground in haste and looks for angry mobs) And there it was love at first sight a printer for under 125 pounds (by 5p) Epson compatible NLQ (Near Letter Quality) screen dump capable all this and a star saying FREE Tractor feed + Cable + Roll feed + Paper How could I resist?

Feverishly my hands trembled towards my building society book I wiped away the dust and cobwebs and slowly opened the light pages Yes through those barely legible time eaten characters I learned I could afford it

Rapidly I turned back to the article thoughts of spending money driving my mind into a frenzy of worry and confusion The clever little black dots caught my eyes All printers come standard with parallel interface 12cps NLQ, 50cps Draft, Seperate tractor and Friction feed logic seeking head (whatever it was it sounded good) uses A4 sheet or continuous original + 2 copies 48 international characters subscripts superscripts and underlining My mind span The list continued dispelling all doubts except one would it work with my humble Dragon? Would this much power kill my little machine?

Hours passed tears dripped I thought Finally the lust for a new printer won out I would take the risk dive into the unknown! I went directly to the building society did not pass go and did not collect 200 pounds My head pounded Could I forgive myself if I found I had blown it? Hands twitching I went to the counter The next few minutes are blanked from my mind I remember nothing the pressure must have been overwhelming But when I came to my senses walking home I found a strange piece of paper in my hand After asking an innocent bystander I found it was called a cheque Not only that but by some strange coincidence it was for the exact value of the printer £132 95 (including the post and packing) I tried to remember what it was for It wouldn't fit in the little hole in my door where the draft comes in so I went to the dreaded magazine cut out the little square form (you see reckless with other peoples property!) filled in the details Two boxes worried me they said Tick BBC or IBM Hmmm a hard one I closed my eyes and ticked at random The BBC Hurriedly I stuffed the cheque and the form in an envelope and scrawled the address on the front Would the postman be able to read my writing? If all went well I would never have to write again I stuck an 18 pence stamp on (nothing like overdoing things) I rushed to the postbox and threw it in

It was Wednesday morning For days I couldn't sleep The tales I had heard of the GPO would make your hair stand on end Thursday passed nothing! Friday came and a ring on the door Had the mafia found me? Cautiously I opened it A tall man with a large box stood there He said Sign ere mate Was I signing my life away? Impulsively I signed And he handed me the box It was heavy very heavy and it even said Viglen on the side No I must be deluding myself two days not even Superman's that fast Was it a joke? Slowly I tore away the sticky tape Pulled apart the brown cardboard Intriguing more boxes within I took one of the boxes out for closer inspection It contained a long piece of strong plastic with black round bits at the end I delved further into the mystery box Paper tractor feed paper and a roll! And still more boxes within lots of polystyrene besides More plastic some transparent some black some cream A piece of ribbon cable with plugs at the ends This was a real Aladdin's cave Still more Some books titled somewhat colourfully *Users Manual* and RX Compatibility Some sheets with literally hundreds of funny squiggles like ESC Z +n1+n2 for quadruple density graphic mode! Had I by some chance found a stray copy of a spaceship operating manual? Again I looked into the box one large ominous package remained I pulled at it I felt it move and again I pulled It came loose Unfolding the cardboard and pulling away the polystyrene revealed it in its full glory A printer my printer by some magic it had arrived before the seven days on the form A few minutes passed as I considered the possibility of union action in the GPO A go-fast motion possibly But then I turned back to the printer In my usual style I ignored the manual with the big letters saying READ THIS BEFORE YOU TOUCH A THING It was a bit like Christmas Quickly I clicked the plastic into the right holes The ribbon was a doddle the tractor feed a delight but the roll feed caught me out I had to look at the manual No help I persevered finally I decoded the clever oriental designs and clicked the piece of metal in place It looked so cute but quickly my brain spotted an absence The mains plug! I dived through my appliances The TV? The Dragon's power supply? The clock radio that you feel like murdering first thing in the morning? Foolishly a long piece of wire with a black box on the end showed itself My hands flowed in swift graceful arcs and within seconds the plug was on the printer!

My instincts told me there was just one thing to do connect it to the Dragon The supplied lead printer end slid in as if it had no other purpose in life probably because it didn't But the other end caused a sudden pain to pass from my brain to my heart The plug was too big no matter how hard I tried it just wouldn't squeeze into the hole in the side of the Dragon marked PI/O It did fit in the other side but somehow I thought that I should do it right (or left depending on how you view it) Tears poured I contemplated suicide and just at that moment my reddened eyes caught something the 20 way plug I had been using to stir my coffee with Could I sacrifice it? I licked off the coffee and tried it in the hole It fitted But would it do the trick? Could the Dragon do with 20 pins what the beeb needs 24 for? Of course when has the Dragon ever been beaten (shut up at the back there!)

I removed the casing on the printer lead Sure enough not all pins were in use After pleading with my friend? for a pinout of the Beeb's printer port (not an easy task after the state I has left his magazine in) I traced the wires and connected them to what seemed like the appropriate pins on the Dragon After a few third degree burns from a vicious soldering iron I had built up a fairly accurate model of the Forth road bridge All very well but would it stand up to being plugged into the Dragon? It did! I went for the big one I turned it on A red light glowed evilly I heard it make a pretty good impression of a milk cart The head stopped in the middle (so that must be where all the logic is!) A green light appeared next to a button (strangely similar to a ZX81 keyboard button) marked ON LINE The scene was set my hands trembled quickly dancing over the keyboard The screen displayed ?#2 TESTING My heart fluttered as I waited for the time to press ENTER I did an eerie silence! Too long I knew something was up Rapidly I pressed the buttons on the printer in a random sequence I pulled and pushed the leads I tried again nothing Why me? Why after all I've done? I looked at the plug in the Dragon Of course it was the only thing I could try! I had plugged it in upside down! Turning it around I repeated the process and on hitting ENTER sweet music filled my ears eeeaaaarrrmmmph Looking down I saw those black letters had appeared in a familiar tongue TESTING they said I keyed in IT WORKS It replied in a tongue I could not understand It occurred to me that this was because the paper had not moved! And both words were on the same line

My fingers danced ?#2 CHR$(11) Shhhrrrumph and the paper had moved visibly by one line! But how could I live in a world where I had to print a chr 11 (line feed) after every sentence? No I wanted more from life than that I wanted a carriage return to make it go Shhhrrrumph Grabbing the manual I saw a picture of a little box with eight small bits of plastic sticking out of it They call it a DIP switch or Dual in Line Pin Under number seven it said CR (AUTO LF ENABLE/DISABLE) With my training in jargon it took just a few hours to realize that this switch was responsible for the misery caused to so many people I grabbed a pencil to change it But the foreboding words of the manual stopped me saying Never use a pencil to change DIP switches Something to do with graphite being conductive I decided to play it safe and use a screwdriver I flicked it For once in my life that little piece of plastic didn't I tried again ?#2 Please work nice little printer It still decided to print on the same line as two other words But at the end of the plead the paper moved up I tried again Success I could read the whole sentence I was spiralling to new heights I looked at the list of hundreds of control codes I tried some NLQ italics extended reduced letters Elite Pica double strike single and double density user defined characters international set tiny letters letters up down underlined Hours of fun for all the family!

So heed my little tale and take a look around for printers even the Dragon can be coaxed into working with them And with printers at these prices, why I might even be able to make it pay for itself if I can write some articles for Dragon User Best wishes in your struggle to buy a printer and I hope you have had more luck than I have but I assure you it's worth it in the end!

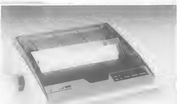
Jonathan Bates

Look for price around £125

Luck boyo? You buy a BBC compatible printer mail order it comes in two days and all you have to do is change a plug and twiddle the DIPs and it works? I should say you had luck!

No, the real message in Mr Bates account of a full-blown printer purchase psychosis (line feed absent the noncompatibility much more) is that it can be beaten with the help of a little knowledge and a great deal of patience. However anyone who is not confident of their ability to re assemble an incompatible cable and win should stick to consulting a reliable dealer as many of our other contributors did

Mannesmann Tally MT 80 Plus



I NEEDED a printer urgently as I had volunteered to produce minutes etc for a local Society — this on top of my need to print my own listings I could afford up to £250 so I ploughed through piles of magazines buyer's guides and all the leaflets I could glean from local computer shops I had some experience of a friend's Shinwa CP80, so had a good idea of what I was looking for Most help was obtained from Fal-Soft (in Falmouth) in the shape of Sales Manager Jim who demonstrated a couple of current models and spoke of updated versions coming shortly One of the leaflets he gave me was for the Mannesmann Tally MT80 (80cps) which had a good specification and LOOKED good as well A few days later Jim phoned to say that his new stock had arrived so I duly popped over there to find a couple of the latest printers on demonstration One was the MT80 Plus happily printing away at 100 cps in all its print modes It filled the bill for me as did its £245 price tag but I was able to negotiate it down to £227 including a mains plug a couple of small goodies and about 400 sheets of fanfold paper I already had a Dragon printer lead so back home it took very little time to unpack the machine fit the mains plug and connect up to my Dragon 32 — simplicity itself with the help of the Operating Manual

The said Manual is detailed and comprehensive with all aspects of operation including a section on the interface options It is a translation from Japanese despite the German name and is generally well written although there are some real howlers here and there to help things along without damage to the main theme

The numerous example programs are excellent and are easy to adapt for the Dragon and clear instructions are given on how to set the twelve slide switches inside the machine before use which is easy Five of the switches cover no less than thirteen international character sets the rest being for various basic form options including a hashed zero There are 103 semi graphic characters available and graphics in the bit image mode In the absence of any good graphic dump programs for the Dragon I have only been able to try a couple of small routines from past issues of *Dragon User* but the MT80 Plus draws very well It has a 8 x 9 matrix to do this but uses only 7 x 8 for normal printing which is still pretty good It will print Pica Elite Sub and Super script with enlarged condensed emphasised etc modes on the first two

The MT80 Plus is a versatile machine and almost but not quite Epson compatible in that italics are obtained in a different way and the codes for the international character sets are ten higher in each case The odd reference in the manual to CPA80 suggest that the MT80 Plus is the same machine in a different case but that should not deter anyone Paper feed incorporates adjustable tractor and friction which will accept fanfold roll and single sheets up to ten inches wide It is possible to print original and two copies from the available 192 ASCII and 160 JIS characters as well as the graphics

There is a very attractive and sturdy smokey brown transparent cover which is slotted so that it can be in situ while printing This not only reduces the noise level further but incorporates a handy tearing edge and a very useful scale graduated every two characters from 0 to 80

I have tried *Telewriter* which is quite good in many respects but is complicated to use and suffers a major drawback as far as I am concerned It has no repeat facility which is a pain in the neck when one needs to print around 70 copies at a time so I have relied on my trusty Dragon to produce good results and write each page into a simple loop which then controls the number of copies required Pam D'Arcy's *Epson Print Base* (DU Feb 87) adapted easily to the MT80 Plus and simplifies access to all its facilities which in turn speeds up production Thanks Pam!! The only problem occurred after about four months when the top row of pins in the print-head stopped printing I took it back to the shop where Jim threw his hands up in horror at what he said was an almost unheard-of fault However under warranty the print head was replaced and I had my printer back within two days. That was eighteen months ago and my printer has worked faultlessly and very hard ever since In that time I have got to know the MT80 Plus a great deal better and my delight with the machine continues to grow This is the basic model with a 112 byte buffer and parallel interface quite adequate for the average user but other options are available for the more ambitious The MT80 Plus is available with either a 2K or 4K buffer and a Serial port is optional on all versions so there is a model to suit all requirements. The ribbon is easy to change and is in cassette form so no inky fingers Replacements are reasonably priced and readily available almost anywhere Yes!! I certainly like this super piece of hardware and would recommend it to anyone especially as it can now be obtained for less than £200 if one shops around

Malcolm Hollins

List price £245 Look for discounts

Panasonic KX P1080U

AFTER saving up £200 I decided to buy a printer and selected the Panasonic KX-P1080U because of the wide range of facilities it offered for the price It's an 80 column dot matrix printer with a 1K buffer and the ability to produce NLQ print in all its fonts The two main fonts are 10 cpi (pica) and 12 cpi (elite) both of which are available in italic style It can also work in compressed mode producing 17 cpi or elongated at 5 cpi Four other printing pitches are easily available The machine can produce graphics dumps in a variety of densities With all this plus tractor and friction feed as standard along with Epson compatible control codes it appeared to be a bargain

The machine was well packed and after removal from its box the job of setting up was attempted The outside case of the machine is of strong plastic and it has a solid robust construction and a weight of 6kg The 104 page A4 manual gave clear instructions on how to remove the carriage stoppers install the ribbon and fit the paper separators The machine was then ready to print The printer has a standard Centronics parallel interface and connection to the Dragon was simple Using the table in the Dragon's manual (**figure 1**) and the table in **figure 2** I made up a lead using 20 way ribbon cable 20-way IDC plug and a 36-way Amphenol plug (**figure 3** shows the pin arrangment of the printer socket) Ready made printer cables can be purchased for about £10

At first the machine would print but not produce any line feeds Then I remembered that the Dragon will produce a line feed automatically if you POKE 330 2 This works but it's not possible to do this when using the disc version of *Telewriter* So back to the printer manual to hunt for the DIP switches These are located below the printer head and are difficult to reach But once I set them to my requirements I have not had to reset them a second time DIP switch 3 makes the printer produce a line feed with every carriage return This is the only switch whose position I have changed since all the others have effects which can be achieved using software codes

I have been using the machine now for 10 months and it has performed faultlessly The manual illustrates the action of all the so-called escape codes (there are masses of them) with Basic examples and providing you substitute PRINT £1 for LPRINT they work On the top of the printer there are several switches The three press ones on the right turn the printer On and Off line produce a Form feed and the third a Line feed On the left there is a slide switch with three positions Std NLQ and Comp The first position produces draft quality output on a 9 x 9 matrix at 100cps The second sets up the near letter quality mode which prints on a 18 x 18 matrix at 20cps The third position produces compressed print at 17 cpi

PIN 1	Strobe	PIN 2	+5 volts
PIN 3	Data 0	PIN 4	+5 volts
PIN 5	Data 1	PIN 6	GND
PIN 7	Data 2	PIN 8	GND
PIN 9	Data 3	PIN 10	GND
PIN 11	Data 4	PIN 12	GND
PIN 13	Data 5	PIN 14	GND
PIN 15	Data 6	PIN 16	GND
PIN 17	Data 7	PIN 18	GND
PIN 19	ACK	PIN 20	BUSY

(Pins 2 & 4 do not need to be used)

Figure 1 Dragon printer connections–odd numbered pins are on the top row with pin 1 on the right

PIN 1	Strobe	PIN 19	GND
PIN 2	Data 0	PIN 20	GND
PIN 3	Data 1	PIN 21	GND
PIN 4	Data 2	PIN 22	GND
PIN 5	Data 3	PIN 23	GND
PIN 6	Data 4	PIN 24	GND
PIN 7	Data 5	PIN 25	GND
PIN 8	Data 6	PIN 26	GND
PIN 9	Data 7	PIN 27	GND
PIN 10	ACK	PIN 28	GND
PIN 11	BUSY	PIN 29	GND

No other connections need to be made

Figure 2 Centronics connection for 36-way Amphenol plug

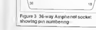


Figure 3 36-way Amphenol socket showing pin numbering

This switch is a boon as it enables me to print out work rapidly to find my many mistakes then when corrected select NLQ for the perfect master without having to remember the appropriate software codes The ribbon cassette is small and rides on the print head It contains a seamless ribbon with a claimed life of three million characters in draft mode So far I have not had to change it and the print quality is fine By way of comparison the multistrike ribbon in my previous machine (Shinwa CP80) needed replacement every two months

There have been no problems with the machine but there are areas in which it could be improved

1 The tear bar has a scale from 0 to 80 to facilitate correct alignment of the paper but the bar is black and the scale is simply indented on it This means that it was almost impossible to read until I filled the indentations with yellow crayon

2 A smoked plastic cover is fitted when a colourless cover would make the print easier to read

3 The method of switching the printer Off line from software is not totally satisfactory Switching back to On line requires another software code as opposed to using the switch on the machine

An audible device to indicate when a page was complete would be useful

The printer is capable of proportional spacing auto right justification has 32 international characters vertical and horizontal tabulation and the ability to store 40 of your own characters Overall the machine has been superb and I have no hesitation in recommending it particularly now that it can be purchased for around £160

Mike Hides

Price around £160

Samleco DX 86

MY very first computer bought in early 1983, was an Oric which alas proved to be no oracle At the same time I bought a Seikosha GP100A printer which I then thought was marvellous having little idea of what a true descender (which it didn t have) was or what nice print should look like how long the ribbon should last (not very long and expensive!) and how much noise one might expect when using it I was then programming with a more knowledgeable friend and when we discovered that the Oric could not handle data files within a program I decided that it would have to go and that I would get a real computer and thus my DRAGON 32 was acquired later that year

By the autumn of 1985 I had acquired a label program to maintain a small club file and found that the Seikosha was very reluctant to feed the rather heavy label stationery unless one helped it along by pulling the stuff throught at the top end You can imagine that the results from this were rather uneven and I came to the conclusion that the Seikosha would also have to go or as the Americans say when they fire somebody be outplaced

Then I came across an advert in *Business Computing* for the Samleco range of printers made in Windsor with only a few imported parts which offered quite a lot of features including plug in interlace cartridges for connection to a whole variety of popular home computers as well as business micros such as the IBM PC for just over £200 including VAT This was the DX-85 but I chose the next model up the DX 86 for £46 more because it could print Near Letter Quality (NLQ) from an 18 by 18 matrix instead of the 9 by 9 printing head standard on the DX 85

I ordered it direct from the factory which at the time gave me a discount and it was sent well packed in polystyrene and carton by Target Express for an extra delivery charge of around £12 This was well worth it as it arrived in excellent order within 24 hours of dispatch

Inside was an 81 page typescript instruction book which tells you first about removing the transit clamp which holds the head and some foam packing which protects the carriage assembly You then mount the separately packed ribbon drive plate and the ribbon cartridge Spares of the latter are obtainable from the factory are about half the price of the Seikosha ribbon last about ten times as long and furthermore are also similar to a very readily available Mannesman Tally 1000 ribbon You then connect the Centronics parallel interface cartridge to the back of the machine and into this in turn goes a standard Dragon printer cable previously obtained from one of the advertisers in *Dragon User* The mains cable and switch is just above the cartridge and on the front of the printer are switches for line feed up or down form feed and on/off line (to the computer) complete with a small on line indicator lamp Three more indicator lamps show power on hardware error and paper end which also sounds a buzzer

It is of course an 80 column machine which has a typewriter like full width rubber roller with hand wheel which takes single sheets of stationery which are held in place with a set of small pinch rollers actuated by a lever on the right The same lever is left in the open position when using standard 9 ½in continuous perforated fan fold paper which is fed by a pair of adjustable pin feed wheels with hinged clamps each side of the platen roller allowing about one inch of width variation

You can then do a self test printout of the character set by switching power on and depressing the line feed button at the same time This was satisfactory and after loading one of my programs the next step was to do a print-out with a LLIST command It did a very crisp clean run at 120 cps in draft mode with the head printing in both directions really very quiet as the inside of the casing is partially lined with sound absorbing sponge rubber and the machine could not be heard in the next room! There is a gentle rocking motion when the head reverses Furthermore a blank 1 inch skipover is available each side of the paper fold perforation leaving a nice neat appearance

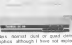
This last feature as well as many others controlled by a series of 14 de[illegible] dip switches which are found at the front just by raising the cover Probably the first thing to set up is the form length of your paper 11in being the usual but this can be changed to 12in 6in or 5½in The next thing is the international character set UK ASCII for the £ sign or US-ASCII for hash which looks better in program listings You can also have French German Danish Swedish Italian Spanish and yes even Japanese as well as IBM character sets

Next comes a choice of typeface Pica at 10 per inch (80 column) Elite at 12 per inch (96 column) and Condensed at 17 per inch (136 column) as well as emphasised in Pica You can change line feeds and carriage returns print your zero with or without a slash and switch when everything is printed over a second time and the speed drops to 35 cps All the switch changes are initialised by turning the power off and then on again after a few seconds

Your print-outs in a data file will look much better if the headings are done in bold double letters and for those of you who are new to printing here is an example how this is done

100 PRINT£2 CHR$(14) Performance Report

The first part opens the file to the printer and the second turns on double width for that line only There are other CHR$ commands for continuous use and for returning to normal size letters These control codes can be implemented in ASCII DEC or HEX and are set out in the instruction book together with all the other software commands which can be used instead of the dip switches described above In addition you can have underlining superscript or subscript emphasized or enhanced



letters normal dual or quad density graphics although I have not explored these yet

One of the things I wanted to use the printer for was my Dragon *Superwriter II* word processor cartridge (unfortunately no longer available) as this can use an 85 column screen size This lets you see on the screen what you get on the paper without scrolling sideways and works well with the 12 cpi Elite type font By using the *Superwriter II* and the printer manuals it is not too difficult to set up printer driver codes in DEC to call up features such as the different type faces underlining or double size letters They are then readily available by pressing only the CLEAR key followed by a single figure and can be saved on tape together with your letterhead address nicely spaced and centred

This is handled very efficiently with the skip over feature switched off The stationery pulls through with ease and prints a nice clear label in 10 point Pica

While the DX-86 may not be the very cheapest printer on the market it is solidly made and has very comprehensive features making it my best buy the cheaper DX-85 must also be considered to be very good value for many Dragon enthusiasts

Peter Singer

Look for price around £250 or less

Shinwa CP80

WITH SIGHTS firmly fixed on my GUN (Great Unfinished Novel) a printer was high on my list of priorities back in 1984 But what type to get?

I needed a reasonably good quality print-out and the ability to print in large quantity onto A4 paper Daisywheel printers offered excellent quality but were too expensive and too slow for my needs A dot matrix printer seemed to be the answer but I was not very impressed with the print quality of the machines which I checked out

Some were better than others but somehow they all managed to look as if they drilled words onto the page — rather like that old advert spelling out the name Milky Bar in bullet holes

All that's but one When I discovered the Shinwa CP80 I knew my search was over This was a dot matrix printer with one special quality — no dots

The pins in the print head on the Shinwa CP80 are square not round As a result while the characters it outputs are slightly thicker than other dot matrix printers they are very near letter quality and are certainly less eye-straining than the peppered print of many dot matrix printers

I will come to the technical details in a moment but let me deal first with the most important question next to the price for a potential buyer — just how reliable has the Shinwa CP80 proved to be over the past three years?

Let me put it this way in those three years my machine has produced ten copies of a 50,000 word book that's around five million characters and doesn't take into account a welter of letters articles and printouts

With one hiccup it has done all that I have demanded of it and is going as strong as ever The hiccup came when the printer was seven months old One of the eight pins in the print head jammed

To make matters worse the company from which I had bought it SCI Ltd had just gone out of business I contacted another Shinwa supplier who put me in touch with Micro Peripherals of Basingstoke who are the UK agent for Shinwa They honoured the guarantee which had come with the machine

Not only that they also replaced the print head and had the printer winging its way back to me by return of post How's that for service?

Now let me turn to the technical side The Shinwa CP80 measures 377mm by 295mm is 125mm deep and weighs 5.3kg (11lbs) The standard model has both friction and tractor feed which means it can take sheets of typewriter paper or continuous fanfold paper with perforated edges

The machine is also supplied with a paper guide wire rack which helps to keep the ingoing and the outgoing paper apart

The interface is standard Centronics parallel which means that it can be connected directly to the Dragon without difficulty via the printer port although there is an optional RS232 serial interface available for other micros

Plugging the printer into the Dragon port and into the mains supply is virtually all that needs to be done to prepare it for action although you will need some sort of program in your Dragon to tell it what to print

The printing speed is 80 characters per second which means it takes about 90 seconds to print an A4 sheet The character set is printed on a 7 by 8 dot matrix and consists of 228 ASCII characters normal and italic alpha numeric fonts symbols and semi graphics

The normal dot density is 640 per line although compressed format is available producing 1280 dots per line Subscript superscript and underlining are all supported

Column width in normal mode is 80 although this can be doubled to 40 columns or compressed to 142 Compressed double width produces a 71 column display and widths can be mixed on one line

Printout options include a choice between a slashed zero and a zero without a slash and the £ sign at ASCII 129

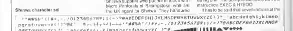
The Shinwa CP80 like most other dot matrix printers can also be used to produce a hard copy of the graphics screen by printing rows of eight pixels at a time The manual accompanying the printer is adequate but suffers occasionally from heavy handed translation from Japanese (I still haven't figured out what it means by the word functionated)

The example programs in the printer handbook use ESCape codes with the LPRINT instruction (use PRINT 2 with the Dragon) and are all in BASIC which is a pity since a machine code routine or two would have been nice for those of us who like our graphics to be dumped to hard copy before our cocoa goes cold

In the September 1984 edition of *Dragon User* Iolo ap Gwynn had a machine code program to do just that It is reproduced in listing one The dump is executed with the instruction EXEC & H7E00

It has to be said that seven indices at the

Shinwa character set



```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmno
pqrstuvwxyz{|}~Ø£                 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOP
QRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{ }~#
```

back of the manual contain a wealth of detail about control codes configuring the printer and using the bit image mode But user friendly it ain't!

However the Shinwa uses Epson-type control codes so it may be possible to find a more friendly Epson manual to answer those questions which the Shinwa handbook doesn't

At the side of the printer is an on/off switch and a small keyboard in the right hand bottom corner has three switches and four LED displays

On power up one of the LEDs lights up but the printer will not accept data until its On-Line switch is pressed When it is pressed two more of the lights come on one indicating that the printer is on line and the other that it is ready to accept data

The fourth LED indicates when the paper is near its end

One of the remaining two switches advances the paper to the next top of form position and the other advances the paper by one line

Line feed is usually controlled by the word processor program in your computer Two sets of dip switches inside the printer can also be set to force a range of control parameters including an automatic line feed

But be warned if you decide to use the Dip switches take a magnifying glass Unless you know precisely where they are they are not easily found

I use the printer mostly for word processing and the two word processor programs I have *Telewriter* and *Flex SP-Edit* carry all the software instructions needed for the Shinwa CP80

Finally I'd better mention the printer ribbon It comes in a clip in cartridge which is easily fitted The cartridges cost around five pounds each and in three years and probably around 700 000 words I have used seven

*The Shinwa CP80 has since been superceeded by the Shinwa CP80A which is basically the same machine but with a 100cps rate

Vince Gledhill

List price £199

Shinwa CPA80

MY Shinwa CPA80 was obtained from S P Electronics in Hucknall Nottinghamshire and cost £228 including VAT and Centronics cable As I live nearby I called in with my D64 and tried it out first — they were very helpful especially when after buying one and spending ages trying to get it to work they pointed out that I hadn't removed a small piece of packing material (see below) C'est la vie! S P advertise regularly in DU

Unpacking the printer reveals a smart box fashioned in brown/beige measuring 384(W) x 315(D) x 125(H)mm and weighing about 5kg Two shipping screws must be removed from the base of the unit before use as well as a small piece of packing foam which is stuck between the printer head and the left hand side of the carriage

The printer is supplied with only one of the two available interfaces serial or parallel These are plug-in units and may be easily interchanged The serial interface is a standard RS232 interface operating via a 20mA current loop at up to 4800 baud The more common parallel interface is a standard Centronics type (the type the Dragon needs) which an amphenol connector Also included on the interface board is a switch which can be used to select either carriage return or carriage return/line feed The operating systems Flex and OS-9 require no line feed character as they automatically send this to the printer but the Dragon's ROM print routine does require it The switch is not designed for heavy use so if it is envisaged that either of these operating systems will be used frequently it is probably wise to fit an external switch in parallel

The manual supplied consists of 80 pages of A5 text diagrams and examples and is very comprehensive although gramatically speaking it does suffer somewhat from being translated from Japanese to American English

On its top panel the CPA80 has three selector switches on line line feed and form feed There are also four indicator lamps power paper out ready and on-line Under a small clip on panel lives a bank of 12 dip switches whose status are determined by the printer at switch-on These may be used to set the initial power up conditions of the printer although almost all the features may be changed at will by software Functions controlled are whether or not to download an alternative character set whether to use normal or emphasised text the default form length (11 or 12 inches) the default line spacing (1/8 or 1/6 inch) the default column length (80 or 142 characters) whether or not to execute a 1in skip over the perforations in continuous form paper and whether to print the zero character with a slash through it or not The position of the remaining four switches sets the default character set Altering the position of any of these switches after power on will have no effect

The CPA80 has two self test routines holding down the line feed button while the printer is turned on causes the entire character set to be printed out Holding down the form feed button whilst power is applied results in a continuous printing of part of the character set until FF is released

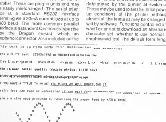
Character sets available are ASCII British French German Danish Swedish Italian and Spanish all with Graphics characters Also available are ASCII (Italics) + Graphics ASCII (Normal + Italics) and ASCII + Greek The CPA80 will even print Japanese Kana characters

Several printing fonts are possible PICA (80 characters/line) and ENLARGED (40 characters/line) Additionally these fonts may be mixed to give novel width characters eg condensed and enlarged Text may also be printed out in emphasised mode which produces a stronger impression on the paper Double strike mode causes the print head to make two passes advancing the paper by 1/216 inch in between This gives excellent near letter quality text even with an ageing ribbon With a new ribbon however this facility is not essential as the pins in the printer head are square and butt up to each other leaving no unsightly gaps Most of these features and fonts may be mixed giving a total of 64 different print modes (in any character set) Subscript and superscript are catered for in any font you wish and the printer also supports proportionally spaced text which removes large gaps around narrow characters such as the letter i The print head has nine pins giving true lower case descenders on letters such as 'q' This feature also enables underlining Some examples of different fonts and features are shown in **figure 1** The carriage may also be reverse wound enabling run time graphs to be printed An impressive example of this is given in the manual

A total of four bit image modes are available 8-pin mode with either 640 or 1280 dots/line (called single and double density) and the same using 9 pins Thus any two-colour screens may be dumped quickly and easily

Software controllable functions include select/deselect paper end sensor print head backspacing moving to next tab stop advancing paper to next logical top of form select printer on/off line empty printer buffer define vertical and horizontal tabs unidirectional/bidirectional printing reset to power up state set line spacing set form length set margins etc.

The CPA80 is not too quiet in use in common with other dot matrix printers Micro Peripherals claim a printing speed of 100 characters per second but I would



```
This text is in PICA mode with superscript and subscript
Here a ELITE text  1234567890 and CONDENSED text on the same line
Enlarged mode has only 40 chars / line
This is near letter quality (double strike) ELITE text
ΑΒΓΔΕΖΗΘΙΚΛΜΝΞΟΠΡΣΤΥΦΧΨΩ αβγδεζηθικλμνξοπρστυφχψω
IF YOU HAVE A TITLE TO PRINT YOU MIGHT AS WELL UNDERLINE IT
Italic text can also be underlined if you want (and superscript and subscript of course
Here's a sine wave produced by reversing the paper feed by n/216 inch
```

100 characters per second but I would estimate it to be nearer 80. This printer will accept either single sheet or tractor feed continuous form stationary. When the paper is depleted a warning buzzer sounds for 3 seconds, printing stops, the printer goes off line to ensure that no text is lost and the paper out light comes on. After re-loading the paper printing may resumed by taking the printer on-line again.

Inside the unit are two sockets marked RAM1 and RAM2. These may be filled with 2 x 2K static RAM chips to provide a 2K or 4K buffer. At under two pounds each, these are a worthwhile investment and are a necessity if you plan to down-load an alternative character set (if you can devise one the printer doesn't already have).

The ribbon used is a nylon backed multistrike carbon cartridge type. They cost about £5 and are readily available since the Commodore MPS 802 uses them. They also last a long time — I have had my printer for one and a half years and I'm on only my second ribbon! In this time I have experienced no problems at all using either the standard Dragon machine, Flex, OS 9 or even a BBC Master (spit!). I would even dare to say that the CPA80 is built even better than an Epson.

In summary this is my best and most reliable peripheral. I wonder how I ever managed without it.

S J Taylor

Look for price around £230 or less.

Tandy CGP Printer/Plotter

THE Tandy Corporation sells a variety of computer equipment and as one of its computers is very similar to the Dragon, some of this equipment is of interest to Dragon owners. I bought from Tandy a CGP 115 Plotter some 18 months ago and I have been very pleased with it.

At the time I was hoping to buy a text printer but the only ones available in my town were cheap and nasty or were much too expensive for hobby purposes.

Although the CGP 115 is primarily a plotter, it can print text quite nicely and it was reasonably priced. I had some doubts initially but the shop manager told me that Tandy allows a 30 day trial of its computer equipment. So I took it home to see I liked it. Long before the end of the period I decided that it would fulfill my requirements.

The list price is now £79.95 but most of the time the machine is on offer at £49.95 and this is what I paid. However I also had to buy a ribbon cable at £19.95(!) to connect it to the parallel port of my Dragon 64. Although I haven't tried it, it ought to be possible to connect to the serial port since the printer can work with one. The printer works with the built in driver of my Dragon and with the normal PRINTSYS of FLEX. There were no installation problems. Four DIP switches have to be set but this is explained clearly in the manual. There has never been any need for maintenance. If I had to buy a printer tomorrow I would either buy the same again or else adopt a quite different approach, namely to buy the PC conversion disc from Compusense so that I could do my printing in the office where I have access to high quality printers.

CGP-115 DEMO

```
COLOUR GRAPHIC PRINTER

-- ------------CIRCLE ---- ------ ---
```

```
10 REM***************************
20 REM* CGP-115 DEMO EX MANUAL*
30 REM***************************
40 TXT$=CHR$(17):GRF$=CHR$(18)
45 R =100. ' RADIUS
50 PRINT#-2,GRF$;:PRINT#-2,"S4":PRINT#-2
,'C0':' GRAPHICS/SET SIZE/COLOUR
60 PRINT# 2,CHR$(13):'CARRIER RETURN
70 RRINT#-2, L0':RRINT#-2,"M0,-50 :'BLAN
K MOVE
80 PRINT#-2,'IR CGP 115 DEMO":PRINT#-2,"
SI'
85 RRINT#-2,"M0,-20'
90 PRINT#-2,TXT$:'TEXT MODE
100 PRINT#-2,CHR$(29);   COLOUR',CHR$(29
),  GRAPHIC ',CHR$(29), 'PRINTER".'TEXT
IN 3 COLOURS
115 PRINT#-2,CHR$(10):'LINE FEED
120 REM ***PLOT CIRCLE***
130 RRINT#-2, ---------------CIRCLE----
------------"
155 FOR J = 1 TO 750:NEXT:'DELAY
160 PRINT#-2,GRF$;"M0,-110,240,-110'
165 RRINT#-2,'I
170 R1 -3.1416 : P2 = 2*PI
180 B$ = M'
190 FOR K = 0 TO 100 STEP2
200 S =(K/100)*P2
210 X -INT(SIN(S)*R). Y =INT(COS(S)*R)
220 PRINT#-2,B$;X; ,',Y.B$='D'
230 NEXT
240 PRINT#-2,"M-290,-240':PRINT#-2,'I
260 PRINT#-2,TXT$
```

Now it is time to put my views into perspective. In this world you have to be very lucky to get value for money. It is unrealistic to expect a £50 pound machine to be in the same class as a machine costing several times more. So what's the catch? Each to his own opinion say I. The principal points to note are:

(a) The CGP 115 prints on paper from a 4.5 inch wide roll — too bad if you must have A4. The text format is either 40 characters per line at a spacing of 5mm between lines or 80 characters at a spacing of 2mm

(b) It writes rather than prints with miniature ball point pens The pens move from side to side and the paper jiggles up and down The result is that the printing speed is a mere 12 cps which is much slower than a dot matrix printer

(c) The machine looks to be a trifle flimsy I would not recommend it to anyone who is accident-prone or to anyone who has to do a great deal of printing

The reader has to judge for himself whether these three points are important

The 40 character line width is very appropriate to the Dragon's natural 32 character screen width I speculate that it is appropriate for submission to journals because editors always ask for wide margins 40 characters down the middle of the page (by careful photocopying) may be quite suitable (*Printers of this type can give problems if the ink feed described below is poor or the ink faint because the result is a faint text which is difficult to photocopy or to print from This is especially a problem with listings but if the printer is maintained and set up properly the problem doesn't arise — Ed*) A feature to bear in mind though is that the printed line is very fine (as befits a plotter with a claimed resolution of 0 2mm) too fine for normal printing purposes Of the four colours blue gives the most legible print and red gives the best contrast for photocopying

Because the machine is really a plotter it has capabilities that are not usually found on printers I have not used them in anger but for the purposes of this review I have tried all the features and I have a small demonstration program based on a longer one in the manual

Other features to note are

(a) In the graphics mode one can control the print size from 80 per 4.5in to 1 per 4 5in

(b) Printing can be from left to right or top to bottom or vice versa if required (eg for the axes of graphs)

(c) Underlining and superscripts can be printed

(d) There are commands to draw a line or move the print head relative to a fixed start point or relative to its present position The line type can be either full or four degrees of dotted The colour can be changed by the program A rather nice command draws the axes for graphs marking the chosen intervals automatically

The manual is well written There are some typing and spelling mistakes but I only found one minor programming error and to be fair it may well be correct with Tandy's own machine I mention it only to save a potential Dragon owner from wasting time If one swaps from text to graphics mode it is necessary to have a pause built into the program immediately *before* the change The program in the manual does not give a long enough pause

To summarise, the CGP 115 is good value for money at the sale price of £49 95 and merits consideration by anyone who has a modest need for a printer and who is prepared to accept its relative slowness and narrow paper width

J B Stinger

Look for list price £79 95 offer price £49 95

Tandy DMP 105

FOLLOWING many months of searching for a printer to enhance my Dragon I visited Tandy in Plymouth to look at the printers they had on sale

I explained to the sales staff what I wanted and they directed me to their computer department The many printers on display were all connected up to computers and the sales staff listened to what I wanted which was A printer to print out programs and make readable neat document drafts

The sales staff showed me the performance of about ten printers The printer that I chose was the Tandy DMP 105 The printer is neat medium sized and very competitively priced at £120 (Since I bought mine the price has been reduced to just £99 95)

The DMP105 has a 10 character per inch print speed of 80 characters per second bi directional print normal condensed and compressed characters graphic character mode

The DMP105 operates in two modes character printing for output of program listings report writing or the creation of any text documentation and a graphics mode for drawing pictures figures or graphs

In the character mode the printer prints monospaced 7x9 dot matrix characters In the graphics mode you can use graphic data to produce any type of graphic configuration you desire

The printer can use two types of paper single sheet of any width from 4in to 9 5in and computer fanfold forms with edge guide holes The printer is capable of producing one top copy plus one carbon copy

The printer is connected to the Dragon via a ribbon cable from the printer I/0 port and has its own power supply lead Included in the price is the tractor feeder and a small cover that fits to the printer when the feeder is not being used A paper separator is used with fanfold paper to prevent the fanfold paper from becoming a tangled mess at the rear of the printer

Connecting the DMP105 to the Dragon is simplicity itself Once plugged into the mains and the ribbon cable connected the paper is loaded the power switch turned on and the printer is ready to be used

On powering up the printer the print head moves from one side of the carriage to the other and then back again If during this time the ON LINE/OFF LINE button is pressed the printer goes into self test mode and prints out the full CHR$ set of all 96 characters available

The printer has two print function switches (DIP) These are set for parallel or serial connection Their function is well explained in the manual

The manual is a very well produced 59 page volume in A4 format It's extremely well written and easy to understand even by the computer illiterate (such as me)

Printer modes which are software controlled are executive line feed carriage return start underline stop underline select graphics start elongation end elongation position print head select standard character select condensed character set carriage return set carriage return and line feed select elite set half forward line feed start bold end bold set full forward line feed select bi-directional printing select uni-directional printing n/72in forward line feed set n/72in forward line feed repeat print data

The DMP 105 is designed for two distinct applications character printing and graphic printing

The printer responds to software codes from the computer in two different ways — one for each application The two response patterns or modes have many similarities but each has its own unique features

The character printing mode is used for printing characters In this mode line feed commands do not cause immediate printing Instead they are stored in the printer's memory along with other data When the current line is printed the line feed commands stored in the memory determines the pitch of the paper feed

Before describing the various print modes available on the DMP105 it may be worth explaining how the computer interacts with the printer

All information is passed to the printer as ASCII code The full list of codes can be found in computer books Most numbers are printed as letters symbols or numbers However the number 0-31 as well as some sequences of numbers are used to control the printer functions These are known as control codes sometimes referred to as Escape codes These codes allow you among other things to change the font setting underline and select special line feed control

Graphics mode is very different as you have complete control over the matrix of dots and also the position of the printer head The pattern of the matrix is passed to the printer as numerical data numbers from 128 to 255 This allows the printing out of high res graphics such as charts letter heads etc

The DMP 105 is a dot addressable printer Therefore (so the manual tells us) line length is not determined by the number of characters but by the number of dots per line By counting the dot columns a combination of different font styles including standard and elongated can be printed on each line The number of addressable dots per line in the Character Printing mode is Normal 960 Compressed 1152 and Condensed 1600

If the length of text the printer receives exceeds the limit of dots per line a line feed is automatically inserted and the last character is printed from the start of the next line (this is known as wrap-around)

I do not use the serial interface on my set up but for those who would like to know about it I am including it for their benefit

Transmission rate is selected by the two dip switches The general specification of the serial interface is

Standard meet with RS-232C serial baud rate 600 or 2400 BPS serial parity non parity buffer up to 134 characters data bit 8 start bit 1 space bit stop bit 1 or 2 mark bits signal cable 15 meters max

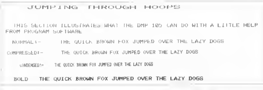
Interface connector type 4-pin DIN socket model TCS 4640-01a or equivalent manufacturer Hoshiden Co Ltd

In summary then I feel the Tandy DMP 105 is extremely good value for money The quality of the printed work is very pleasing and would put many printers at almost twice the price to shame The performance of the printer seems limited only by the imagination of the operator

The DMP105 is Manufactured for Tandy in Japan The catalogue number is 26-1276 It is worth noting that the ribbon cable is not supplied with the printer (This is something I can t understand it is like buying a bicycle without a chain) But don t worry too much I was quoted a price anything from £20.00 to £5.94 so my advice is to shop around Tandy do sell the lead

I have no reservation in recommending this printer to anyone and in fact following visits to my home three of my work colleagues have bought the DMP105 I hope that this article is of some help for those unable to go from shop to shop and bedger the sales staff into explaining the printers on sale *Ian Martin*

Look for price £99 95 or a little over



```
        JUMPING  THROUGH  HOOPS


  THIS SECTION ILLUSTRATES WHAT THE DMP 105 CAN DO WITH A LITTLE HELP
FROM PROGRAM SOFTWARE

  NORMAL:-      THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS

 COMPRESSED:-      THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS

    CONDENSED:-    THE QUICK BROWN FOX JUMFED OVER THE LAZY DOGS

  BOLD   THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS
```

```
          THE LISTED PROGRAMM SHOW  HOW ESCAPE CODES MAY BE [illegible]
10 PRINT#-2,CHR$(27),CHR$(14);         JUMPING THROUGH HOOPS
20 PRINT#-2, CHR$(13)
30 PRINT#-2, CHR$(27);CHR$(15),             THIS SECTION ILLUSTRATES WHAT THE DMP
105 CAN DO WITH A LITTLE HELP           FROM PROGRAM SOFTWARE"
40 PRINT#-2, CHR$(13)
50 B$="       "
60 A$="THE QUICK BROWN FOX JUMPED OVER THE LAZY DOGS
70 N$="NORMAL:-     ":CO$="COMPRESSED:        ":CN$="CONDENSED:
80 PRINT#-2,B$+N$+A$
90 PRINT#-2,CHR$(13)
100 PRINT#-2, CHR$(27);CHR$(23);B$+CO$+A$.
110 PRINT#-2, CHR$(13)
120 PRINT#-2, CHR$(27);CHR$(20); B$+B$+CN$+A$
130 PRINT#-2, CHR$(27);CHR$(19)
140 PRINT#-2, CHR$(13)
150 PRINT#-2,CHR$(27);CHR$(31)B$+"BOLD    " +A$
151 PRINT#-2, CHR$(13):PRINT#-2, CHR$(27);CHR$(32)
```

```
10 'THIS IS A SHORT PROGRAMM TO ILLUSTRATE THE SCREEN GRAPHIC DUMP
20 ' IT IS NOT THE MOST ELEGENT SOLUTION TO THE PROBLEM BUT IT DOES WORK.
100 PMODE 3,1:SCREEN 1,0:PCLS 1
110 FOR R=10 TO90
120 FOR S=0 TO 1 STEP 0.2
130 FOR C=2 TO 4 STEP 2
140 CIRCLE (128,96),R,C,1,S+C/4,S+C/4+0.1
150 NEXT C
160 NEXT S
170 NEXT R
180 SOUND 12,10
190 A$=INKEY$:IF A$="P" THEN210 ELSE 190
200 X=0:Y=0
210 FOR Y=0 TO 191 STEP7
220 FOR X=0 TO 255
230 A=ABS(PPOINT(X,Y)-1)*1+ABS(PPOINT(X,Y+1)-1)*2+ABS(PPOINT(X,Y+2)-1)*4+ABS(PPO
INT(X,Y+3)-1)*8+ABS(PPOINT(X,Y+4)-1)*16+ABS(PPOINT(X,Y+5)-1)*32+ABS(PPOINT(X,Y+6
)-1)*64
240 IF A>127 THEN A =0
250 N=A+128                 280 NEXT X
260 PRINT#-2, CHR$(18);     290 PRINT#-2, CHR$(13);
270 PRINT#-2,CHR$(N);       300 NEXTY
```

Expert's Arcade Arena

Write to 'The Expert' at Dragon User
12-13 Little Newport St, London WC2H 7PP
with all your arcade tips and hints

GOOD AFTERNOON or morning or whatever time it s that you re reading this If you could all raise your glasses please the toast is Joe Brincat who has managed to map out the whole of *Total Eclipse* Universe One The task of finishing universe one is certainly mammoth the task of mapping the universe is even more mammoth and the task of presenting it neatly and clearly is pure Joe Brincat (*We ve printed it as large as we can but you may have to use your intuitions with some of the names — Ed*) Good luck with Universe Two Joe

Now then a lesson for you all about the way to address me within your correspondance The example for you comes from M Hall He starts Your Highness — This is a good start — I am having some problems understanding how to use some of the POKES you have most graciously supplied in you noble column I have had complete success with the likes of *Shock Trooper* but *Tube Way Army* is a mystery to me What use is the RESET Poke when you give a LIVES address what should be Poked to it? Can you furnish me with details on how to cheat more efficiently?

I offer humble thanks for your valuable time and think that the column s the best thing since the Pan Galactic Gargle Blaster

Now then this is how to write a letter Well done M by the way who stole the rest of your first name? The answers to your questions are that a RESET Poke stops the machine from cold starting when you push the button on the side of the machine The LIVES address should be poked with the number within set limits which if unspecified are 0 255

Now then to come back to Joe s map printed in on the centre pages the following points should be kept in mind when using it

1) The map shows version 1 3. Other versions may be different
2) There is no hypergate down from galaxy 9 to 8 so collect as many credits as possible before going over to galaxy 9
3) If you try to go through the Black Hole in galaxy 11 you must have obtained a shard otherwise you will disintegrate

Now then to *Shaolin Master* And also to a name that has been never before seen in this column Yes this is a name "P"R"E"M"I"E"R"E" come on down R A Crofts (hmm another one who s had his first name pinched maybe there s a case here for the great detective Sherlock Expert) who provides a way to beat the computer opponent every time on *Shaolin Master Plus* it runs thus

BOUTS 1 & 2 As soon as you have been given the instruction to fight put the joystick in the top left position to do a forward somersault to meet the computer opponent in the middle of the screen Keeping the joystick where it is press the fire button Your man should now do a high back kick to fell your computer opponent You should get 400 points for this every time you do it on bout one and 800 on bout two

BOUT 3 On the word fight put the joystick in the top left position During the second forward somersault put the joystick in the middle right position Your opponent should then back somersault to land in front of you When he lands press the fire button This should give you 400 points

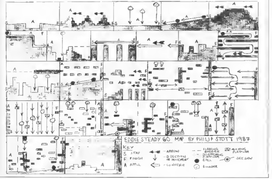
BOUT 4 Put the joystick in the bottom left position and hold When the computer opponent somersaults toward you put the joystick in the top right position Every time the computer opponent lands press the fire button (this one will take a lot of time and practice to perfect!)

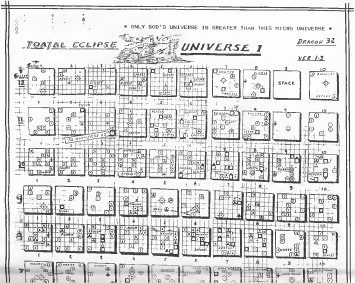
BOUT 5 Repeat method for bout 3 but put the joystick in the top position and hold down the fire button This should drop kick the opponent for 1000 points

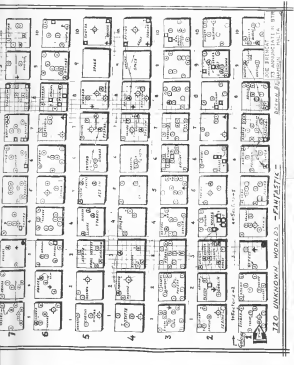
Right that s that now then how about some more game solutions from you? By the way what do you think of Philip Stott s *Eddie Steady Go Map* pretty good eh?

Here s a nice little routine from Paul Bergin for Incentive s *Moon Cresta* Load it up using SKIPF POKE 1266 POKE 1270 EXEC 46941 204 1 2 142 96 68 237 129 231 32 6 Finally start the program with EXEC 9216. This should make your small ship invulnerable

That s it for this month but next month sees the pulication of edited highlights of Paul Burgin s Hacking sheets for which I send him my thanks and yes my admiration and if that isn t a world first nothing is




* ONLY GOD'S UNIVERSE IS GREATER THAN THIS MICRO UNIVERSE *
TOATAL ECLIPSE
UNIVERSE 1
DRAGON 32
VER 1.3
SPACE
TO UNIVERSE 02
12
11
10
9
8
7


120 UNKNOWN WORLDS - FANTASTIC -
DRAWN BY
JOE BRINCAT
73 ANNUNCIATI IN STR
HAMRUN MALTA
SPACE
1
2
3
4
5
6
7
8
9
10

An Epson, not an Epson

B. Yeoman Walker on printer codes, with a program to print out Star DP510 type styles

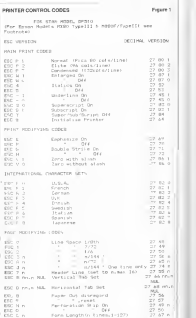
THE trouble with this article is that it falls between two stools. It was prompted in the first place by the ever helpful Pam D'Arcy's article in the February 1987 *Dragon User*. She made three major points. (1) Epson control codes have long been the standard for the dot matrix printer industry. (2) The control codes involving several CHR$(X) statements for each are extremely tedious to use, particularly when several different codes have to be sent before printing can commence or to alter something during printing. She offered a neat method of converting codes to string variables, resulting in considerable simplification in the control of the printer. (3) Tied in with the letter she offered a program for printing cassette labels which would greatly ease the labour involved.

Taking these three points in turn. (1) Unfortunately she did not mention which model Epson she was using, and the one of which I am aware has codes which are noticeably different from the codes she gives. So there must be at least two Epson standards. Now it so happens that I don't have an Epson, but I do have a manual for the Epson MX80 Type III, MX80F/T Type III, which shows in particular that there are no ESC x codes, and so Pam D'Arcy's program would not work as it stands with one of these machines. (2) Her point about the tedious nature of the ESC codes touched a sensitive nerve, as they are SO tedious that I had never investigated more than a few on my Star DP510. So here was the opportunity to do something about it. (3) Though labelling was not of immediate interest, I had long felt the need for a program that would print comparable examples of the same few words in ALL the type styles available, to assist in deciding which particular style is best suited to, say, the headline on a form or the title for an article. The program would have to be structured somewhat differently from Pam D'Arcy's label printer.

I came to own the Epson manual in interesting circumstances. The manual that came with my Star DP510 Printer unfortunately gives the codes only in their ESC form, eg ESC W 1 (for enlarged mode), but no indication of how to achieve them, and for several weeks I was virtually stuck. During a conversation with a friend, who has not got a Dragon but who has got an Epson printer, he kindly produced his Epson manual which showed exactly how the codes are put in. Most of the codes (but not all) were identical to those of my Star, and as the manual was tending to fall apart from the binding he graciously agreed to buy a new one and sell me the old.

I learned from this Epson manual, for example, that the above code was typed in as CHR$(27) CHR$(87) CHR$(1). Note that the first two sets of brackets contain the ASCII equivalent of ESC and W

PRINTER CONTROL CODES **Figure 1**



```
             FOR STAR MODEL DP510
(For Epson Models MX80 TypeIII & MX80F/TypeIII see
Footnote)

ESC VERSION                                DECIMAL VERSION

MAIN PRINT CODES

ESC P 1         Normal (Pica 80 cols/line)        27 80 1
ESC P 2         Elite (96 cols/line)              27 80 2
ESC P 3         Condensed (132cols/line)          27 80 3
ESC W 1         Enlarged On                       27 87 1
ESC W 0                  Off                      27 87 0
ESC 4           Italics On                        27 52
ESC 5                  Off                        27 53
ESC - 1         Underline On                      27 45 1
ESC - 0             '     Off                     27 45 0
ESC S 0         Superscript On                    27 83 0
ESC S 1         Subscript On                      27 83 1
ESC T           Super/Sub/Script Off              27 84
ESC @           Initialise Printer                27 64

PRINT MODIFYING CODES

ESC E           Emphasize On                      27 69
ESC F               "     Off                     27 70
ESC G           Double Strike On                  27 71
ESC H               "     "    Off                27 72
ESC V 1         Zero with slash                   27 86 1
ESC V 0         Zero without slash                27 86 0

INTERNATIONAL CHARACTER SETS

ESC R 0         U.S.A.                            27 82 0
ESC R 1         French                            27 82 1
ESC R 2         German                            27 82 2
ESC R 3         U.K                               27 82 3
ESC R 4         Danish                            27 82 4
ESC R 5         Swedish                           27 82 5
ESC R 6         Italian                           27 82 6
ESC R 7         Spanish                           27 82 7
ESC R 8         Japanese                          27 82 8

PAGE MODIFYING CODES

ESC 0           Line Space 1/8th                  27 48
ESC 1             '    '   7/72                   27 49
ESC 2                      1/6                    27 50
ESC 3 n           '    '   n/144 '                27 51 n
ESC A n           "        n/72                   27 65 n
ESC J n           '        n/144 ' One line only  27 74 n
ESC 7 n         Header Line (set to n.max 16)     27 55 n
ESC B nn.n NUL  Vertical Tab Set                27 66 nn.n
                                                    NUL
ESC D nn.n NUL  Horizontal Tab Set              27 68 nn.n
                                                    NUL
ESC 8           Paper Out disregard               27 56
ESC 9                "   ,reset                   27 57
ESC N n         Perforation Skip On               27 49 n
ESC O              '         Off                  27 50
ESC C n         Form Length(n lines.1-127)        27 67 n
ESC C 0 n       Page Length (n ")                 27 67 0 n
ESC M n         Left Margin(n cols max 127)       27 77 n
ESC Q n         Right Margin(n cols.max 127/L)    27 81 n
```

respectively but the third brackets contain the ACTUAL number 1 and NOT its ASCII equivalent An alternative form is to replace the middle term CHR$(87) with W but this cannot be done with the first and third terms

You will notice that the in the Listing has been replaced by + This is because of the use of string variables which will only accept a + I forgot this until after I had typed in the whole program and on trying RUN got the dreaded SN ERROR so had to edit the change to + for every one

My initial reaction to Pam D Arcy s article was merely to produce a corrected chart and program showing the codes for the Star DP510 and modifications for the Epson MX80/III s But as I progressed the need to examine all the type styles available became more urgent so I decided on a new program to achieve it

Figure 1 gives all the codes for the STAR DP510 taken from the Manual and arranged in an order most suited to my purpose A footnote shows where those of the Epson differ

Figure 2 is a list of the Test Print options (TP$(N)) used for my program It has been kept separate from the Listing to avoid clutter (and to save memory) As far as possible I have used the same symbols for the strings variables as Pam D Arcy s for interchangeability but there are one or two differences This list is incomplete since I am not currently interested in general printing and for brevity I have omitted all the line feed codes etc but of course it can easily be expanded by anyone having the need

In the Listing the Base Program s contained in lines up to 340 lines 1000-1510 set up the Test Print options available and lines 1600-1620 contain the FOR NEXT loop that prints the options

The words to be printed are edited in between the quotes in line 1610 in place of YOUR printing TEST The string variable IP$ at the end of this line resets the printer back to the original default mode after each printed line This is very economical since it saves having to use cancel or off codes in many lines

Line 35 dimensions TP$ to the number 50 used if you increase or decrease the number of options then DIM should be adjusted accordingly since the DRAGON only accepts 10 in default Pam D Arcy mentions a proportional facility but this does not appear to be available in either the Star or Epson models under discussion

So if you have either of the types of Epson printers (manufactured by Shinshu Seiki Co Ltd) or the Star DP510 you could adapt any of them to either of these two programs with a little judicious SEIKI-atric massaging (ouch — sorry Madame Editor) (*You want a job as a headline writer eh?*) of a few codes

Those of you who like me have purchased small amounts of software from Pam D Arcy at Pamcomms Ltd will know from experience how fair and helpful she is If you haven t then you will just have to take my word for it

By the way if you use a Star DP8480 — the codes are NOT all the same

Figure 1 continued

```
MISCELLANEOUS

ESC U 1          Print Unidirectional On          27 85 1
ESC U 0            "                  Off         27 85 0
ESC Y 0          BEL(Buzzer) Off                  27 89 0
ESC Y 1                      Restore              27 89 1
ESC              8th Bit = 1"                     27 62
ESC =            8th Bit ="0"                     27 48
ESC £                 restore to orig.form        27 35
ESC K n1 n2      Col.Scan Bit image mode
ESC L n1 n2          "    "     "    "


MISCELLANEOUS NON ESC CODES

NUL              Ends Tabs, * follows some ESC     0
CR               Carriage Return ("ENTER")        13
LF               Line Feed                        10
VT               Vert Tab                         11
FF               Form Feed                        12
HT               Horizontal Tab                    9
SO               Shift Out(Enlarged Type)         14
CP                 "         Cancel               12
DC4                "    "                         20
SI               Shift In(Condensed Type)         15
DC2                "    " Cancel                  18
DEL              Delete                          127
BS               Back Space                        8
BEL              Bell(Buzzer)                      7
DC1              Printer on line                  17
DC3                 "    off line                 19
("DC" = Device Control )


FOOTNOTE

Codes for EPSON Printers Models MX89 TypeIII and
MX80F T Type III appear to be similar to the above
with the following exceptions:-
```

LIST OF TEST-PRINT OPTIONS

Figure 2

```
TP$(1)  = Normal(Pica)
TP$(2)  = Elite
TP$(3)  = Condensed
TP$(4)  = Enlarged
TP$(5)  = Normal,Italics
TP$(6)  =    "   ,Emphasised
TP$(7)  =    "   ,Double Strike
TP$(8)  =    "   ,Emphasised,Double Strike
TP$(9)  = Elite,Emphasised
TP$(10) =    "  ,Double Strike
TP$(11) =    "  ,Emphasised,Double Strike
TP$(12) =    "  ,Italics
TP$(13) = Condensed,Emphasised
TP$(14) =    "        ,Double Strike
TP$(15) =    "        ,Emphasised,Double Strike
TP$(16) =    "        ,Italics
TP$(17) = Enlarged(Normal),Emphasised
TP$(18) =    "        "      ,Double Strike
TP$(19) =    "        "      ,Emphasised,Double
                              Strike
TP$(20) =    "        "      ,Italics
TP$(21) = Elite,Enlarged
TP$(22) =    "      "     ,Emphasised
TP$(23) =    "      "     ,Double Strike
```

```
TP$(24) =    "       "      ,Emphasised,Double Strike
TP$(25) =    "       "      ,Italics
TP$(26) = Condensed,Enlarged
TP$(27) =    "             "      ,Emphasised
TP$(28) =    "             "      ,Double Strike
TP$(29) =    "             "      ,Emphasised,Double Strike
TP$(30) =    "             "      ,Italics
TP$(31) = Normal,Italics,Emphasised
TP$(32) =    "       "    ,Double Strike
TP$(33) =    "       "    ,Emphasised,Double Strike
TP$(34) = Elite,Italics,Emphasised
TP$(35) =    "       "    ,Double Strike
TP$(36) =    "       "    ,Emphasised,Double Strike
TP$(37) = Condensed,Italics,Emphasised
TP$(38) =    "            "     ,Double Strike
TP$(39) =    "            "     ,Emphasised,Double Strike
TP$(40) = Enlarged,Italics,Emphasised
TP$(41) =    "           "     ,Double Strike
TP$(42) =    "           "     ,Emphasised,Double Strike
TP$(43) = Elite,Enlarged,Italics,Emphasised
TP$(44) =    "       "        "     ,Double Strike
TP$(45) =    "       "        "     ,Emphasised,DoubleStrike
TP$(46) = Condensed,Enlarged,Italics,Emphasised
TP$(47) =     "          "        "     ,Double Strike
TP$(48) =     "          "        "     ,Emphasised,Double Strike
TP$(49) = Superscript
TP$(50) = Subscript
```

```
5 'Listing
10 'BASE PROGRAM FOR STAR DP510 PRINTER
15 'B. YEOMAN WALKER 1987
20 'WITH ACKNOWLEDGEMENTS IN PART TO PAM D'ARCY
25 PCLEAR1
30 CLEAR6000
35 DIM TP$(50)
40 'MISC VALUES
50 AA$=CHR$(1)
60 AB$=CHR$(0)
70 AE$=CHR$(27) 'ESCape Character
80 NN$=AE$+"P"+AA$ 'Normal(Pica)
90 LN$=AE$+"P"+CHR$(2) 'Elite
100 CN$=AE$+"P"+CHR$(3) 'Condensed
110 EN$=AE$+"W"+AA$ 'Enlarged On
120 XN$=AE$+"W"+AB$ 'Enlarged Off
130 OI$=AE$+"4" 'Italics On
140 XI$=AE$+"5" 'Italisc Off
150 OY$=AE$+"S"+AB$ 'Superscript On
160 OZ$=AE$+"S"+AA$ 'Subscript ON
170 XZ$=AE$+"T"  'Super/Sub/Script Off
180 OU$=AE$+"-"+AA$ 'Underline On
190 XU$=AE$+"-"+AB$ 'Underline Off
200 NE$=AE$+"E" 'Emphasised On
210 XE$=AE$+"F" 'Emphasised Off
220 OD$=AE$+"G" 'Double Strike On
230 XD$=AE$+"H" 'Double Strike Off
240 IP$=AE$+"@" 'Initialise Printer
250  International Char. Sets
260 ZU$=AE$+"R"+AB$ 'U.S.A.
270 ZF$=AE$+"R"+AA$ 'French
280 ZG$=AE$+"R"+CHR$(2) 'German
290 ZE$=AE$+"R"+CHR$(3) 'English
300 ZD$=AE$+"R"+CHR$(4) 'Danish
```

continued on page 26

Moving programs

Mike Hides moves machine code without taking a peek

HAVING a disc drive is great, no more long waits and the dreaded I/O ERROR is now a thing of the past. But I often have need to move programs from one disc to another. This is easy with Basic programs but with machine code programs typing in the PEEKs to find out the START END and EXEC addresses soon becomes an unwelcome chore. This utility resides at the top of memory and after loading a BIN file will display the necessary address details by entering EXEC32600. Using an assembler the program can be placed anywhere in memory. **Listing one** shows the program as entered using the ALLDREAM assembler. **Listing two** allows you to POKE the information directly into memory.

How the program works

After a machine code program is loaded from a disc, the Start address is stored in memory at locations 652 and 653 (hex), the program Length at 654 and 655 and Exec address at 656 and 657.

By PEEKing each pair of memory locations and doing a little arithmetic the addresses can be arrived at.

For example PRINT PEEK(&H652)*256 +PEEK(&H653) will produce the START address. The lower address of each pair stores the hi-byte and the higher address the lo-byte. The program uses the Y register to store these memory locations (line 40) and is incremented by one in line 310 after each is accessed.

Line 50 uses a ROM routine to clear the screen after which lines 60 and 70 position the cursor on the text screen by loading the value into the X register and storing it at memory locations 88 and 89 (hex). This value can be anywhere between 1024 and 1535. This is repeated throughout the program to control the position of output on the text screen. The program then jumps to the subroutine LOOP (line 240) which starts by printing the line of text on the screen. This uses a useful ROM routine located at 90E5 (hex) which prints from the address one after that in the X register until a zero byte is found. The program is then sent twice to the BITOUT subroutine before returning for a new line of text.

To obtain the value of the start address use is made of the fact that 8 bit binary numbers can easily be split into 2 digit hexadecimal numbers.

In writing this utility the book by Smeed and Sommerville *Inside the Dragon* has been invaluable. It is an excellent source of ideas and useful subroutines.

Example

If memory location 652 (hex) holds 10100001 and location 653 (hex) holds 11000100 then these can be combined as follows

10100001 is A1 (1010 = A and 0001 = 1)
11000100 is C4 (1100 = C and 0100 = 4)

This gives the Start Address of &HA1C4.

To achieve this the binary number has to be split into two halves and each half converted into hexadecimal. Line 320 saves the value of the A register while the first part of this task is completed. The LSRA mnemonic means Logical Shift Right so if register A contained 10100001 (161 decimal) this would change in four steps as follows

```
     10100001
LSRA 01010000
LSRA 00101000
LSRA 00010100
```

LSRA 00001010 the value is now 10 decimal or A hexadecimal. This is now sent to the DIGOUT subroutine which prints the character A on the screen. Line 380 restores the value in register A to 161 decimal which is sent to the DIGOUT routine. This routine first performs a logical AND (line 420) with the value in register A which has the effect of masking off bits 4 to 7 ie if register A contained 10100001

```
10100001
00001111
```

the result of ANDA $F is 00000001 (1 decimal)

This is sent to the DIGOUT routine which prints the character 1 on the screen. Thus the screen now gives the information
START &HA1

The memory location 653 (hex) is examined and the appropriate characters printed on the screen. Using the values previously mentioned the screen now displays
START &H7F58
LENGTH &H007C
EXEC &H7F58
Finally lines 180 and 190 set the position of the cursor to a convenient place and line 200 returns the control to Basic.

Listing 1

```
                                    100       LDX   #POS+64
10          ORG     32600           110       STX   $88
20          PUT     $4E21           120       LDX   #LINE2-1
30    POS   EQU     1057            130       JSR   LOOP
40          LDY     #$652           140       LDX   #POS+128
50          JSR     $BA77           150       STX   $88
60          LDX     #POS            160       LDX   #LINE3-1
70          STX     $88             170       JSR   LOOP
80          LDX     #LINE-1         180       LDX   #POS+192
90          JSR     LOOP            190       STX   $88
```

```
200          RTS
210 LINE1    FCC     /START  &H/,0
220 LINE2    FCC     /LENGTH &H/,0
230 LINE3    FCC     /EXEC   &H/,0
240      LOOP    JSR     $90E5
250              LDX     #1
260      TWICE   JSR     BITOUT
270              LEAX    1,X
280              CMPX    #3
290              BNE     TWICE
300              RTS
310      BITOUT  LDA     ,Y+
320              PSHS    A
330              LSRA
340              LSRA
350              LSRA
360              LSRA
370              BSR .   DIGOUT
380              LDA     0,S
390              BSR     DIGOUT
400              PULS    A,PC
410              RTS
420      DIGOUT  ANDA    #$F
430              CMPA    #9
440              BLS     CHOUT
450              ADDA    #7
460      CHOUT   ADDA    #'0
470              JSR     $B54A
480              RTS
```

Listing 2 – BASIC loader program

```
 10 CLEAR 200,32599
 20 FOR N = 32600 TO 32723
 30 READ A$
 40 POKE N,VAL("&H"+A$)
 50 NEXT N
 60 DATA 10,8E,06,52,BD,BA,77,8E
 70 DATA 04,21,9F,88,8E,7F,85,BD
 80 DATA 7F,A4,8E,04,61,9F,88,8E
 90 DATA 7F,8F,BD,7F,A4,8E,04,A1
100 DATA 9F,88,8E,7F,99,BD,7F,A4
110 DATA 8E,04,E1,9F,88,39,53,54
120 DATA 41,52,54,20,20,26,48,00
130 DATA 4C,45,4E,47,54,48,20,26
140 DATA 48,00,45,58,45,43,20,20
150 DATA 20,26,48,00,BD,90,E5,8E
160 DATA 00,01,BD,7F,B5,30,01,8C
170 DATA 00,03,26,F6,39,A6,A0,34
180 DATA 02,44,44,44,44,8D,07,A6
190 DATA E4,8D,03,35,82,39,84,0F
200 DATA 81,09,23,02,8B,07,8B,30
210 DATA BD,B5,4A,39
```

To save SAVE"NAME",32600,
32723,32600

To initiate the progam
use EXEC32600.

If you've got a technical question write to Brian Cadge. Please do not send a SAE as Brian cannot guarantee to answer individual inquiries

Dragon Answers

M-code auto run

I HAVE used your 'auto run routine to autorun Basic programs on my Dragon However I have a number of machine code programs mostly games used by my young son which I would like to convert to autorun if possible Could you supply an idiot's guide to the exact procedure to do this?

Mr T Potter
48 New Road
Chiseldon
Swindon
SN4 0LU

THE 'quick and dirty' method of autorunning machine code programs is to use the procedure below

1 Type in POKE 25 6 POKE 1536,0 NEW and press ENTER
2 Type in the following Basic program exactly as listed
10 CLS 3 PRINT @ 268, Loading
20 CSAVEM AUTORUN 150,2000,0 SCREEN0,1 POKE 104 0
CLOADM EXEC
3 Press PLAY/REC and RUN this program
4 When LOADING turns orange press the reset button
5 Load your machine code program (but don't run it)
6 Save the program on the tape immediately after the header just saved — eg CSAVEM "GAME" start end entry

When you want to autorun the game just CLOADM AUTORUN

Renum crash

I HAVE a small program of about 2K which is written in Basic and occupies lines 1 to 67 consecutively and which has a large number (444+ approx) of data lines attached to it starting at line 100 making the total memory used in excess of 31K I use POKE 25,6 NEW to enable this large use of data However when I tried to RENUM 100 100 1 the total program I got a ?RO ERROR

This does not appear to be listed in the Basic manual and nothing I could do would retrieve the program Could you please explain what RO ERROR is and how to avoid it using all the available memory

Alastair Burr
156 Folly Lane
St Albans
Herts

THE reason you cannot find the RO ERROR in your manual is that it is not a valid error Unfortunately if you use RENUM on a large program with very little free memory it tends to crash the computer in a variety of ways (such as printing a non existant error message or clearing the screen) and inevitably corrupts the Basic program in memory This all happens because RENUM uses the Basic stack for temporary storage (this is held at the top of RAM and grows downwards) it does not check that there is enough free memory before starting the renumbering process!

The only way to get around this problem is to free more RAM For example delete the first ten lines of your program type in RENUM 100 100 1 and then type back in the first ten lines of your program Alternatively get a friend with a Dragon 64 to renumber the program for you in 64 mode.

CoCo break

I HAVE been using your BREAK key disable routine published in the March 1986 issue of DU in most of my Basic programs However I now want to transfer them to the Tandy CoCo machine I use the CSAVE PROG A method to transfer the Basic but could you please give a CoCo version of the disable routine?

Alan Fincher
Bristol

THE BREAK key disable routine uses a couple of ROM routines and this is why it does not work on the CoCo The version listed below is an amended one which will work with the Tandy machines

```
*
* RETURNS COLOUR OF PIXEL AT
* CURRENT X Y POSITION IN B REG
*
PPOINT     PSHS A X Y U
           JSR  42647
             (37661 for COCO)
           JSR  42534
             (37528 for COCO)
           ANDA  X
           LDB  182
           RORB
           BNE  LABEL1
LABEL2     CMPA #4
           BLO  LABEL3
           RORA
           RORA
           BRA  LABEL2
LABEL3     INCA
           ASLA
           ADDA 193
           LSRA
LABEL4     TFR A B
           PULS A X Y U
           RTS
LABEL1     TSTA
           BEQ  LABEL4
           CLRA
           BRA  LABEL3
```

Hunt the pixel

AT the moment I am writing a four colour screen dump for the Tandy CGP 115 printer I have set up a loop using the A register to hold the horizontal position (from 0 to 255) and the B register to hold the vertical position (from 0 to 191) My problem is that I need to find the colour of an individual pixel from its X Y position

P Marlow
50 Lime Avenue
Bentley Walsall
W Midlands

The routine listed below is based on the ROM's PPOINT function it will return the colour of the pixel at the graphics position X (16 bit in 189/190) Y (16 bit in 191/192) for the current graphics PMODE All of the graphics variables must be set up correctly (this will be done automatically if you execute the correct PMODE command before EXECing to your routine)

Two ROM routines are used the first adjusts the standard co-ordinates in 189/190 and 191/192 to actual co-ordinates for the current graphics mode (held in 182) The second routine calculates the physical address in RAM of the byte containing the required pixel The colour of the pixel is returned in the B register and depends upon the current colour set If the routine is to be used on the Tandy CoCo then substitute 37661 for the first routine and 37528 for the second routine address)

```
5 'DISABLE BREAK KEY (INC INPUT LINES)
  - COCO VERSION
10 CLEAR200,32550
20 FORI=0 TO 55 READA$ POKE 32551+I,
   VAL( &H'+A$) NEXT
30 DATA 8E,7F,3C,BF,01,6B,8E,7F,54,BF,
   01,9B,86,7E,B7,01,6A,B7,01,9A,39
   0D,6F,27,01,39,32,62,34,14,BD,A1,
   99,BD,A1,C1,27,F8,81,03,27,F4 7E
   A1,B9,9F,DF,35,10 30,04,34,10 9E,
   DF,39
40 EXEC 32551
```

ROM swap

I HAVE a Dragon 64 with DragonDOS and have recently acquired a copy of the Tandy CoCo ROM on disc (ie a 64K binary file) What I want to know is this would it be possible to load the CoCo ROM into the 64 in RAM mode and hence fully emulate a CoCo — and how?

Iain Salter

IT WOULD be quite simple to load the Tandy ROM into the Dragon at address $8000 in RAM mode and hence emulate a CoCo However the main problem is that the keyboard has a different layout on the Dragon to the CoCo and hence you would need to patch the keyboard routine to take account of this (starting at address $E200 in the Tandy ROM)

I should point out that to copy (and run) the Tandy ROM is almost certainly breaking their copyright on that version of Microsoft Basic.

Winners and Losers

Every month, Gordon Lee will look at some prize programming points from a previous month's competition

HOW MANY prime numbers can you pack into a 6 x 6 grid? This was the essence of February's competition and one which certainly proved a formidable task. Unlike most of the competitions there was no absolute solution the object being to score the highest number of different prime values possible and judging by the entries received this was a very hard-run contest with a difference of only 7 primes separating the top three places.

Table 1 gives the scores and grids of the top six entries received. In the grid column each competitor's grid is listed across in order. The task itself was not an easy one and many readers opted for a method utilising more than one program as an aid to assessing the best strategy to adopt in compiling their final grid.

Basically the task fell into two sections i) compiling the grid and ii) extracting all component values from the grid and testing each for primality.

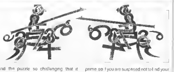
The first of these raises a number of interesting points. Clearly as all primes with more than one digit must end in either 1 3 7 or 9 these digits should predominate in the grid. However using these to the exclusion of the even digits and 5 would be counter productive as only a small percentage of possible primes are comprised exclusively of 1s 3s 7s and 9s. Hence the judicious use of the other digits must be considered. As to how many and where in the grid they should be placed leads to a near impossible assessment of factors.

Possible grids

Looking at the task from a purely theoretical point of view there are 1036 possible grids, although this number can be divided by 8 if we eliminate all rotations and reflections of any given grid. Even so if we could test these grids at the rate of a million per second it would still take 4,000,000,000,000,000,000 000 years to complete the task! Limiting ourselves to mainly to 1s 3s 7s and 9s would still take over 18 million years.

On a more practical level almost all entrants used the method of seeding the grid with digits and then attempting to improve their score by altering specific digits in turn. In fact the highest scoring grid was based on the May 1984 competition grid which according to Alan Towlson of Nottingham wrote to say that he found the puzzle so challenging that it diverted him from his open university studies. In the course of his endeavours (in the competition not OU) he reports the existence of the prime 199931 which is not only prime in both directions but also if you chop successive digits off from either end. He ends his letter with the note that he intends to try to find some higher-scoring grids. If Mark or any other readers find any such grids I will announce the results on a future page. In the meantime here is my own best score — a grid with 170 primes

313991 963929 164312 517471 715971
937339



Once the grid has been filled with the 36 digits it is necessary to split it up into all of the component numbers and to test each for primality. This was an area which tripped up a number of entrants. In fact quite a number of scores were reported as being higher than those in **table 1** but unfortunately they all contained many values which were not prime so if you are surprised not to find your scores on the list please re-check your primes. Other competitors included the same prime more than once and some even cheated themselves by failing to spot primes that were present in their grids. This was clearly the result of failing to dissect their grid completely into its component values. For readers who wish to continue their investigations in a 6x6 grid there 14 six-digit numbers 32 five-digit numbers bringing the grand total up to 616. Of course it is impossible for all of these numbers to be prime. For example there are only 21 two-digit primes, and 220 positions to fit them in. A table listing the number of primes of varying digit size is given. As an aid to readers who are interested in pursuing the problem further.

This month it has been difficult to be specific about particular points from the programs submitted due to the wide diversion of methods used but hopefully the general points which were outlined may be of use for future reference.

Table 2

Digits	Primes	Lowest	Highest
1	5	1	7
2	21	11	97
3	143	101	997
4	1061	1009	9973
5	8363	10007	99991
6	68906	100003	999983

Table 1

Competitor	Score	Grid.					
Alan Thomas	158	379349	311933	769193	137577	982743	991391
R H Wilson	156	973917	112757	199713	964879	337185	313373
Mark Towlson	151	971171	311279	798392	346735	313727	991931
Phil Sapiro	139	373311	953995	146173	170937	397181	991523
A Siddiqui	123	317233	199733	179837	346731	334799	311931
G R Barber	122	129719	313739	117431	736793	911969	773779

Write: ADVENTURE

Peter Gerrard links verb and noun with some action

LAST MONTH we took a brief look at the creation of a simple parser for a Dragon adventure with the promise that this time around we d be looking at something a tinge more sophisticated However as several people have mentioned to me wouldn t it make more sense to concentrate first of all on the vocabulary of the game rather than the programming around that vocabulary Which came first the chicken or the egg the vocabulary or the parser? Since we seem to be alternating from programming to theory each month we will revert to theory for this article and take a look at how one might go about building up a large vocabulary for an adventure game Next month back to programming again

Descriptions and problems

In the parser mentioned last month we concentrated on a simple VERB NOUN style of command entry but it s well worth bearing in mind that the finished product will be rather more sophisticated Sentences like

Turn the Key in the Door

Put the Book on the Table

and soon will all be understood by the new parser The verb and noun are fairly obvious (Turn and Door in the first example Put and Table in the second) but where do the other words come in and how are they understood? A brief diversion

When the parser accepts a command from the player it will first of all remove all occurrences of the words the and a so that (for example) turn the key in the door becomes turn key in door It will then look for the verb (obviously turn in this case) before selectively going through the rest of the sentence to see what it will look for but if the player only typed in a verb and a noun then it will cope with that quite happily It is the other two words (key and in) that concern us here

As you can probably imagine key could equally well be used as a noun (as in find key for example) but here it obviously is not meant to be a noun at least not in the old VERB NOUN scheme of things It is what I have termed for want of anything better to call it a linking word That is it helps to link the verb and the noun together

The word in on the other hand is certainly never meant to be a noun (open the in ?) and this falls into a category that I have called action words That is a collection of words whose use implies performing an action of some kind Shoot the alien with the phaser would give us shoot and phaser as the verb and the noun respectively alien would in this instance become the linking word while with is obviously the action word

Dealing with the latter first of all action words then can be thought of as words like in on under beneath with and so on No adventure would probably have more than twenty or twenty five of them and they could be read into a simple array by doing something like

```
10 FOR I = 1 TO 12 READ AC$(I) NEXT I
1000 DATA in on under over into onto next
beside with at beneath
```

Or something like that They are in short all the words that you can possibly think of that would imply an action of some sort

The parser works by first of all looking for a verb then (if one exists) a linking word followed by (again if one exists) an action word and finally a noun If only three words are used (as in climb under table) then the word under is taken to be a linking word Thus we look for verb link action noun in that order So as you can probably guess by now for every action word there must be a corresponding linking word Like this for example

```
20 FOR I = 1 TO 12 LI$(I)=AC$(I) NEXT I
```

But consider the problem further We ve already seen that link words can also be used as nouns or vice versa So if we have (say) 120 nouns we would also need a line like

```
25 FOR I = 1 TO 120 LI$(I=20)+NO$(I)
NEXT I
```

assuming that all the nouns were stored in an array NO$. This then gives us a simple equation The number of link words will be equal to the number of action words plus the number of nouns

Having now decided how the action words and the link words are to be made up (the former by choosing the words yourself the latter by combining all the action words together with the nouns) how then do we settle on the verbs and nouns in the first place?

Verbs and nouns

Every adventure should have a common subset of verbs that are used in virtually every game that you might write Some common verbs would be the direction ones such as north south east west (and you may care to use up and down as well or northeast and all other compass points if you feel that way inclined) plus abbreviations like n s etc for lazy players like myself You can readily appreciate that by having the first dozen verbs made up of

```
2000 DATA north south east west up
down n s e w u d
```

we would also have to have the same dozen first nouns in case someone typed in go north or whatever

Having got the directions sorted out there are a number of other verbs that should be used in all your games Not only does this make it a lot easier for you to write but it also gives the player a sense of familiarity and a little bit of confidence in the knowledge that he can use words that he s encountered before Here I m thinking of words like help (which I usually only use if there s enough memory left at the end of the game a rare occurence!) inventory save restore (never use load to recall one s saved progress as a number of adventures might require you to load a gun for example) get and take (not to be confused with each other they are not mutually exclusive and nor are they totally compatible to use an old example you take medicine or you get medicine In the former you might swallow something and end up as a hideous demon in the latter you might simply be carrying a bottle around with you) drop and discard wear and remove open and close and soon I m sure you can think of many other words that should be used in all adventures but that is enough to be going on with By including our direction verbs as well we already now have 24 different verbs! And all this before we have even really begun to get started

The rest of your verbs will obviously vary from adventure to adventure although you may well want to have examine and search in all of your games The remainder will come from two sources the room descriptions and the problems that you have set the player As a general rule you ll find that most of your verbs come from the problems while most of the nouns will come from the descriptions This is obviously not a hard and fast rule but if you are in the fortunate (and rare) position of having some spare memory left at the end of the game and you want to use that to flesh out the vocabulary a little bit then those are the places to look

So where might you begin? The easiest thing to do is to print out (or type if you haven t got a printer) all the room descriptions that you re going to use in all their glory No abbreviations either print out the entire description You might have a sentence like You are walking along a cobbled street What would you do if you were the player and saw a sentence like that? I for one would want to examine cobbles but if your abbreviated room description said simply walking along street you wouldn t as the writer think of it

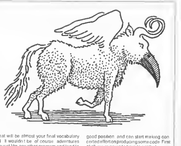
Secondly print or type out all of the problems and the solution The very least you can do for the poor souls who are going to be playing your games is to ensure that they can solve them! Taking a 64 location adventure as an example you might have set the player some 16 problems to solve a 1 to 4 ratio is always reasonable Thus the first thing the player might have to do is to get out of a locked room Verbs and nouns immediately start to form and if the solution to the problem requires the player to type in

LOOK UNDER BUNK
TAKE GOLDEN KEY
INSERT KEY IN DOOR

Then you can see straight away where three verbs are coming from (look take insert) three nouns (bunk key door) an action word (in) and three link words (under golden key) You'll notice that of the three link words one (under) is really an action word while the other two (golden and key) will also be nouns All this and we've only had one problem so far!

Go through all your problems in this manner and if you find yourself with a totally unwieldy number of verbs and nouns (anything more than about a hundred of each is getting a little bit too much for our humble Dragon) then out with the Thesaurus and hunt through for a few synonyms In other words try not to use different words at different times so that a player specifically has to type in gather 'collect take or whatever Use different words by all means but do not have a vast amount of separate code for each one Let the code do the work of sorting out specific instances

Having gone through all you room descriptions (which you have got more or less prepared haven't you?) and all your problems (same question) you should be in a very good position for coming up with what will be almost your final vocabulary list It wouldn't be of course adventures are just like any other program and tend to grow in the writing so that what started off as a 300 word paragraph becomes the opening chapters of War and Peace but at least it will be a start



Conclusion

Having done all that we are now in a very good position and can start making concerted effort on producing some code First of all we're going to have to get that parser working properly having done all the work to produce the vocabulary for it so try and get everything sorted out for next time and try also to have a go at producing the parser for yourself You never know what you might come up with but don't worry if you give up in disgust Rescue is at hand next month

continued from page 20

```
310 ZW$=AE$+"R"+CHR$(5) 'Swedish
320 ZI$=AE$+"R"+CHR$(6) 'Italian
330 ZP$=AE$+"R"+CHR$(7) 'Spanish
340 ZJ$=AE$+"R"+CHR$(8)  Japanese
1000 'TEST PRINT ADDITION TO PRINT
     ONE LINE IN EACH TYPE STYLE
1010 'B.YEOMAN WALKER 1987
1020 TP$(1)=NN$
1030 TP$(2)=LN$
1040 TP$(3)=LN$
1050 TP$(4)=EN$
1060 TP$(5)=OI$
1070 TP$(6)=NN$+NE$
1080 TP$(7)=NN$+OD$
1090 TP$(8)=NN$+NE$+OD$
1100 TP$(9)=LN$+NE$
1110 TP$(10)=LN$+OD$
1120 TP$(11)=LN$+NE$+OD$
1130 TP$(12)=LN$+OD$
1140 TP$(13)=CN$+NE$
1150 TP$(14)=CN$+OD$
1160 TP$(15)=CN$+NE$+OD$
1170 TP$(16)=CN$+OI$
1180 TP$(17)=EN$+NE$
1190 TP$(18)=EN$+OD$
1200 TP$(19)=EN$+NE$+OD$
1210 TP$(20)=EN$+OI$
1220 TP$(21)=LN$+EN$
1230 TP$(22)=LN$+EN$+NE$
1240 TP$(23)=LN$+EN$+OD$
1250 TP$(24)=LN$+EN$+NE$+OD$
1260 TP$(25)=LN$+EN$+OI$
1270 TP$(26)=CN$+EN$
1280 TP$(27)=LN$+EN$+NE$
1290 TP$(28)=CN$+EN$+OD$
1300 TP$(29)=CN$+EN$+NE$+OD$
1310 TP$(30)=CN$+EN$+OI$
1320 TP$(31)=OI$+NE$
1330 TP$(32)=OI$+OD$
1340 TP$(33)=OI$+NE$+OD$
1350 TP$(34)=LN$+OI$+NE$
1360 TP$(35)=LN$+OI$+OD$
1370 TP$(36)=LN$+OI$+NE$+OD$
1380 TP$(37)=CN$+OI$+NE$
1390 TP$(38)=CN$+OI$+OD$
1400 TP$(39)=CN$+NE$+OD$
1410 TP$(40)=EN$+OI$+NE$
1420 TP$(41)=EN$+OI$+OD$
1430 TP$(42)=EN$+OI$+NE$+OD$
1440 TP$(43)=LN$+EN$+OI$+NE$
1450 TP$(44)=LN$+EN$+OI$+OD$
1460 TP$(45)=LN$+EN$+OI$+NE$+OD$
1470 TP$(46)=CN$+EN$+OI$+NE$
1480 TP$(47)=CN$+EN$+OI$+OD$
1490 TP$(48)=CN$+EN$+OI$+NE$+OD$
1500 TP$(49)=DY$
1510 TP$(50)=DZ$
1600 FOR N=1TO50
1610 PRINT£-2,N;TP$(N);"
     YOUR Printing TEST";IP$;
1620 NEXT N
```

Pete GERRARD'S ADVENTURE TRAIL

A STRANGE parchment concerning *Colossal Cave* adventure (published for the Dragon by Cowen Software 23 Bristol Avenue Manchester M19 3NU for £6.00) has fallen into my grasp recently It occured to me that it might be of interest to anyone attempting to wade through this larger than usual Dragon adventure

JULY 1st

Some holiday this has turned out to be That I Professor Deadrock should be stuck on an 18-60 holiday with a bunch of neanderthal juveniles the very hissing of their Walkmen setting my teeth on edge is intolerable Fortunately accommodation at the well house is better than expected and having equipped myself with food and water (and picked up some keys and a lamp which had been carelessly discarded) will set off tomorrow and hope to leave my younger acquaintances behind

JULY 2nd

Lost interest but soon found myself following an old stream down a valley All water eventually disappeared through hole in ground and stared at enormous steel grate for some time before obvious solution sprang to mind Tried key and it worked! Hung on to key though have strange feeling that it might yet come in useful again Walked underground some way turned light on and spent inauspicious night in small chamber Strange footsteps constantly invaded my dreams

JULY 3rd

Walkmen now just a nightmare although am haunted by fear of bumping into Anneka Rice Thought my fears had turned to reality but I was just a beastly dwarf who scurried away into the gloom as I scowled at him Cad threw an axe at me which mercifully missed otherwise he would have felt the rough edge of my tongue and no mistake Unusual objects to be found hereabouts and have added a gilded cage and a black rod to my list of possessions

JULY 4th

Spent several hours puzzling over bird found in splendid chamber Threw rod at the thing in disgust which missed of course and sailed merrily on into another room Bird now more than content to be caught and placed in gilded cage What would David Attenborough have to say about that I wonder? Retrieved rod somewhat shamefacedly

JULY 5th

Found myself in a vast hall To one side in a low room was a gold nugget! Decided to leave it where I found it country code and all that Whistling *Hall of Mountain King* to myself as am wont to do in moments of crisis when heard answering whistle! Large snake in path Tricky cove refused to move Bird's twittering now getting on nerves as well so thought kill one bird with one snake and fed it to the reptile in the hope that having eaten it would go away Imagine my suprise when wretched bird attacked and killed snake! Suppose blessed thing wants feeding now but we Deadrocks can be hard hearted at times Threw cage at it instead and am firmly convinced that that's the last I'll see of those two items

JULY 6th

Unusual happenings Was strolling back towards well house (weekend coming up) when saw unusual graffiti in debris room where I'd first found the black rod XYZZY it read in a flowery script XYZZY I repeated (it sounded like zizzy to me) and was immediately overcome by strange giddy sensation and found myself in the well house! There's one for Paul Daniels to puzzle over Muttered XYZZY again lest anyone listening and back in debris room again! Hurried round collected gold nugget and raced back to well house to store it safely assuming any of my fellow holiday makers can be trusted Said XYZZY once more and spent a peaceful night in debris room Much to ponder

JULY 7th

All sorts of rooms leading from this hall of mists Had found some coins (placed in back pocket for safe keeping) and some jewellery in a south side chamber (must take it back to base sometime) when stumbled across and almost into the east bank of a wide fissure Nearly overbalanced in attempt to avoid falling in the blessed thing and waved rod to steady myself Could hardly believe my eyes when a crystal bridge appeared from nowhere to span the chasm One of Brunel's finer if unsung achievements

JULY 8th

Crossed suspiciously over bridge and carried on west Found some diamonds (rum bit of luck that) and placed rod carefully on ground next to them Am highly uncertain about that rod A rod well burned if you ask me Returned in some haste to east back to the vanquished snake and went north into the hall of the mountain king Carried on north and soon in north south passage Silver bars on floor my lucky day obviously Carried on to north and saw a large Y2 carved on a rock Why Me? I quipped and no sooner had I spoken than a hollow voice said plugh Say Plugh to you too I was about to riposte but barely had I spoken the first two words when was overcome by strange giddy sensation once more I was back in the well house and fearful of the startled gaze of my fellow holiday makers (gold nugget still there I noticed) whispered plugh quietly Was back in Y2 room Curled up next to rock and fell instantly into troubled sleep

JULY 9th

Decided to leave belongings here for time being Reflected on bird now no doubt wandering aimlessly about the caves Tried to identify species couldn't quite place it and in momentary pang of conscience must have spoken loud Perhaps it was a plover and no sooner had I said the words say plover is a possibility when room went giddy and found myself in something called the plover room A large emerald met my surprised gaze Tried to carry it out of room but couldn't fit through small crack to west Dropped everything save emerald breathed in and managed to squeeze out Darkness! Dropped emerald in my horror and raced back into plover room and my belongings Picked up lamp again and looked around A large platinum pyramid I can sense Auntie casting a proprietary eye over that one and with a final say plover I was back at my Y2 rock again Phew! One is rapidly becoming accustomed to strange magical events on this holiday

JULY 10th

For want of anything better to do was going on long stroll home with treasures when scarcely two moves from my Y2 home a bearded pirate pounced on me and stole my treasures! Tricky johnnies pirates gave chase naturally and found myself in the west end of the hall of mists Went south and disaster! In a maze of twisty passages all the same Stumbled about in my terror heading first east then south south and south again north off to the east north east then finally in my desparation north west Lo and behold a pirate's treasure chest plus all my original treasures Bundled them all together staggered under the weight and headed southeast north and north again I was back at Y2 Muttered thank plugh for that and of course was once more whisked to the well house Dropped all treasures Back to Y2 once again and discovered had left coins in back pocket after all Couldn't be bothered with them and fell soundly asleep

JULY 11th

Holiday nearly over and batteries of lamp starting to run out already Went to hall of mists again stumbled west and west once more into a long featureless hall then finally fell south into a maze of twisting passages Alas these are all different and hurried in my desperation turning west north east east east and east a fourth time In front of my tired eyes I saw a large vending machine! Instinct took over from thought and I deposited my coins into the machine Instantly some fresh batteries fell out and more by luck than judgement managed to turn west and then east in my confusion Back in the featureless hall again where I soon hurried home to Y2 Strange how one comes to regard these places as home after a while

JULY 12th

A determined effort to see this thing through now From Y2 I went down and west down and west until I stumbled across bedquilt For no other reason than it was there went west into a room whose walls resembled swiss cheese but being unable to stomach cheese under any circumstances I hurried east again into a different room! A soft pillow for my bed was before me so I picked it up and hurried out If going east wouldn't work I attempted to go west but stubbed my toe and went north west instead An oriental room with a ming vase! Raced back to Y2 plughed my way home and was about to drop the ming vase to the floor when the pillow fell from under my arm and landed first Fortuitously it broke the fall of the vase Raced back to Y2 could sense time running out and once more to the oriental room Headed north and then west into a small alcove where much to my amazement the emerald was still waiting for me Picked it up scurried away and as luck would have it was back in the swiss cheese room again Headed roughly west and up into a secret north south canyon Then going south to try and escape I found myself nose to scale with a fire-breathing dragon! Pon my soul I had no time to spare and in horror at this cruel blow that fate had dealt I attacked the beast myself! I should have known with the cowardice of years bred into the animal fled before the ire of an Englishman leaving behind a rather nice rug further decoration for the well house Scuttled back to Y2 and then the well house once more depositing emerald and rug next to my rapidly growing pile of treasures Time will not defeat me now I am confident

JULY 13th

An inauspicious date on which to explore pastures new but find myself driven by powers beyond my comprehension Forced into swiss cheese room then east into twopit (or is that two pit) room Tripped over slab of rock and fell into westernmost pit almost smothering a small plant which muttered water water at me Took pity on it and watered it copiously Percy Thrower sackcloth and ashes the thing grew at a staggering rate and had the nerve to bellow water water!! at me Raced around for some water and once more tried to drown the thing It grew explosively but I didn't get where I am today by climbing these things unprepared Out of pit east then as chance would have it I tripped over a stone and fell down into the eastern pit this time into a small pool of oil Filled bottle back to plant climbed it and in enormous set of caves until progress halted by rusty door Oiled it went on and found a trident and a nest of golden eggs! Some idiot had scrawled fee fie foe foo on the wall an illiterate obviously

JULY 14th

Last day of holidays Explored anew and found myself in a large room near bedquilt with a clam in it Foolish thing wouldn't open so retreated for jewelled trident and tried again Snapped open pearl fell out and caught up with it two rooms away Raced treasures back to wellhouse but kept eggs food key and lamp with me just in case Explored near bedquilt and oriental room and found myself on a rickety bridge just in front of a deep chasm One step troll appeared to block my path Could spare him no time and threw the eggs at him He vanished and I fairly sped across until I was in a room with a large bear Not thinking I threw my food at it and it calmed down Once I had undone the golden chain that tethered it to the wall it followed me like a limpet evincing great interest in some rare spices that I had found Back to the bridge and dropped the bear in fright at seeing the troll again The bear scurried after the troll which was wearing a stony expression and I consoled myself with the thought that the two would given time manage to cross the great social gulf that divided them Went back to read strange writing on wall where I'd first found the eggs and said fee fie foe foo to myself The eggs reappeared! Was about to race home when voice told me that caves were closing Couldn't get out! Wandered around found myself transported into strange room with lots of rods birds in cages snakes and all manner of things at once familiar and frightening Picked up a rod threw it away went into another room and said blast when I couldn't find the rod Some hidden mechanism went off a vast explosion carried me with it and from nowhere hordes of cheering elves appeared and carted me off in praise and glory What would Anneka Rice make of this I couldn't help thinking?

JULY 15th

Am on my way home laden down with treasure which I shall probably auction I see the 18 60 club is organising yet more holidays Perhaps I shall go on one when they do

ME AGAIN

How could a chap like Professor Deadrock solve a complete adventure game just like that when the rest of us struggle for months and months? Perhaps we shall never know bye for now

Adventure Contact

To help puzzled adventurers further we are instituting an Adventure Helpline — simply fill in the coupon below stating the name of the adventure your problem and your name and address and send it to Dragon User Adventure Helpline 12/13 Little Newport Street London WC2H 7PP As soon as enough entries have arrived we will start printing them in the magazine

Don't worry — you'll still have Adventure Trail to write to as well!

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Problem ....

....

Name ....

Address ....

Communication

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Name Maarten AMJ Van Wamelen
Address 3 Lynmetestraat Oedelem 8330 Belgium

Problem Has anybody got a copy of *Mirror tile*? I have managed to delete line no 1340 have no hard copy and cannot remember where the program came from Line 1330 reads PRINT @J 4+I 64+8, B$(B(I J)) — I need the next line
Name P Neech
Address 56 Cathwaite Paston Peterborough Cambs PE4 6BE

Problem I have a copy of *Trivial Crosswords* and would like to copy the crossword grids without words onto a hard copy Does anybody know of a way of doing this? Any help would be most appreciated
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Make a note

Feeling crotchety? Sound out **Gordon Lee's** *latest puzzle*

LAST MONTH while discussing some oddities connected with the number 7 we noted that of all the digits 7 was the only one for which there was no easy test for divisibility By easy test we mean a quick method by which we can determine if a given number is an exact multiple without having to actually work it out Before the advent of computers (and pocket calculators) this was often an important consideration and much time and effort could be spared by use of such tests Even with the use of computers knowledge of these tests can still have their applications For example a simple test may be quicker and so speed the execution of a program or the mathematical accuracy of the computer may be pushed to its limit and possibly produce questionable results Again the number under test may be longer that the nine or so digits that an eight bit micro can handle

Outlined below are some simple tests for divisibility by numbers from 2 to 12 without as has been mentioned the number 7 Divisibility means exactly divisible without remainder

2 A number is divisible by two if the last digit is even

3 If the digital root of a number is divisible by 3 then the number itself is also divisible by 3. Not quite so well known is the fact that if this digital root results in a remainder this is the same remainder that would occur if the actual number were divided For example the number 1234567654321 has the digital root 4 This leaves a remainder of 1 when divided by three so the 13-digit number itself would leave this remainder Readers who are not familiar with the term digital root should refer to this page of February's *Dragon User*

4 If the last two digits of the number is evenly divisible by 4 then the complete number will be It doesn't matter how many digits are in the actual number So long as we know the final two we can establish the test for divisibility Any remainder will be that resulting from division into the complete number

An everyday use of this test is in determining leap years If the last two digits of the year is exactly divisible by 4 then (subject to certain other considerations) the year is a leap year

5 Only if the final digit of the number is a zero or a five is the number exactly divisible by five Any excess over zero or five will indicate the remainder

6 As six is the product of 2 and 3, every multiple of six will pass the test for both 2 and 3 In other words it must be an even number with a digital root divisible by 3

8 Take the last three digits of the number If this is divisible by eight then the complete number will be also If there is any remainder then this represents the remainder from the complete number As a general principle this rule applies to all powers of 2 Thus to test for divisibility by 2n it is only necessary to consider the last n digits of the number Therefore to test for divisibility by 16 take the last four digits and so on

9 The test for nine is similar to that for three If the digital root of the number is nine then the number itself is a multiple of nine Otherwise any remainder will be that found in the actual division For an example of this test see Problem 2 on the competition page of last August's *Dragon User* and the solution given the following month

10 This is really too obvious to need stating but a number divisible by 10 must end in zero If it does not the final digit will equal the remainder

11 To test for divisibility by 11 start at the units digit and add this and every alternate digit proceeding to the left Call this total A Now add together the other set of alternate digits and call this total B Find the result of A minus B If this result is zero or a multiple of eleven then the number is divisible by eleven To find the remainder if the division is not exact either If the total is positive subtract the highest multiple of 11 which is lower than the total This will be the remainder If the total is negative add a multiple of eleven to bring the value to just above zero This will be the remainder

For example the number 4270739161 should be tested as follows

$$A = 1 + 1 + 3 + 0 + 2 = 7$$
$$B = 6 + 9 + 7 + 7 + 4 = 35$$
$$A - B = 28$$

To minus 28 add the next highest multiple of eleven (33) that will make the value positive The result 5 indicates the remainder

In this column in the past it has been remarked that all palindromic numbers with an even number of digits must be a multiple of eleven With the above proof this statement is not difficult to understand!

And finally 12 As twelve is the product of 3 times 4 tests for both of these numbers should prove positive for all multiples of twelve

This concludes this quick survey of divisibility tests which may prove useful to number theorists and potential competitors alike — and if mention of the competition is music to your ears this month we have a musical competition in more ways than one

Prizewinners this month can win a copy of the new *Music Maker* routine from John Penn Software and the competition is based on the name of this program

Using the words MUSIC MAKER take the nine digits 1 to 9 (zero is not used) and assign a different digit to each different letter in the above name This must be done in such a way that the five-digit values represented by both MUSIC and MAKER are both perfect squares

In how many different ways can you carry out this substitution if we make a rule that for each pair of values MAKER is higher than MUSIC?

Prize

Music Maker is a new package which will play music you copy into it in four parts teach you to read music (if you like), and save your tunes as machine code routines John Penn Software has contributed ten copies of this, one of the few full-price packages on their extensive list for the ten most inspired entries The ten runners will get £3 00 discount vouchers from the Penns

Rules

Listen closely to the wise words of Gordon Lee compose your response get your Dragon to recite it onto a printout and mail your opus with any notes you wish to add to *Dragon User* in an envelope marked JULY COMPETITION Don't forget to include your name and address Don't forget to include our name and address either

Now for this month's tiebreaker (go on ask em to write a tune) I want one or two of those songs by singers titles which have been the mainstay of joke pages since the days of Adam

You know How much is that doggie in the window by Bach The song is over by Buster String That sort of thing As many as you like but one sharp one beats a dozen flats Extra points for Dragon references

April Winners

Strewth! I thought Not many entries ... then I found an April on top of the May pile and a May on top of the April pile. Panic over

Panic begins again Really took a lot of sifting this lot

The prizes are 20 copies of Tanglewood the ultra popular semi-adventure from Microdeal And they re sitting on my shelf ready to go. The lucky recipients are

M Armitstead of Basingstoke J Hewitt of Hixon Fred Willers of Yarnfield (best poem definitely but too long to print here!) Alan Thomas (second best poem), Clive C Scott of Ashstead Terry Potter of Chiseldon Denis O Mulloy of Comberton, Phil Sapiro of Liverpool John S Bleich of Addlestone P D Maddocks of Taplow Iain Huggins of Caerphilly Colin Miller of Cononbridge (can you drop us a line please, Colin your address is indecipherable) R Christon of Thirsk E A Newman of Addlestone Robin J Telkman of Sale Dave Lardener Richard Long of Camberley F J Taylor of Acklam Keith David of Crawley and S A Siddiqui of Chiswick

Just for the record the most popular rhyme for tangle was wangle

Solution

The answer will appear in the next issue.

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